NEUROLOGIE & REHABILITATION

Neuroprotektion | Neuroplastizität | Neurologische Langzeittherapie

Organ der
DGNR
DGNKN
OEGNR
SGNR

S1 | 2023

ECNR 2023
European Congress of NeuroRehabilitation

Lyon

30 August – 2 September 2023
France | hybrid

Abstracts of Oral Presentations
and Posters

ECNR 2023
European Congress of NeuroRehabilitation
30 August – 2 September 2023 | Lyon, France | hybrid

Abstracts of Oral Presentations and Posters

GENERAL INFORMATION

Congress presidents

Dafin Mureşanu (Romania)

Isabelle Bonan (France)

EFNR Executive board / Core organising committee

Dafin Mureşanu (Romania)

Volker Hömberg (Germany)

Dana Boering (Germany)

Caterina Pistarini (Italy)

Karin Diserens (Switzerland)

Elia Fischer (Switzerland)

Presidents of affiliated national societies / Programme committee

Andreas Mühl (Switzerland)

Gert Kwakkel (Netherlands)

Christian Dohle (Germany)

Gelu Onose (Romania)

Susanne Asenbaum-Nan (Austria)

Mauro Zampolini (Italy)

Manoj Sivan (Great Britain)

Louise Nørreslet Gimsing (Denmark)

NEUROLOGIE & REHABILITATION

Neuroprotektion | Neuroplastizität | Neurologische Langzeittherapie

IMPRESSUM

ORAL PRESENTATIONS

O001

Balance rehabilitation through robot-assisted gait training in post-stroke patients: a systematic review and meta-analysis

A. Loro (Novara/IT), M. B. Borg (Novara/IT), M. Battaglia (Novara/IT), M. Invernizzi (Novara/IT, Alessandria/IT), L. Scotti (Vercelli/IT), A. Baricich (Novara/IT)

Background: Stroke is the second leading cause of death and the first cause of disability in the world. After the clinical stabilization of the acute stroke, the rehabilitation program is usually focused on upper limb and gait rehabilitation, while balance is often a secondary or ignored outcome, even if balance impairment is a common disability in post-stroke survivors, leading to reduced mobility and increased fall risk. Robotic gait training (RAGT) is largely used, along with traditional training. There is, however, no strong evidence about RAGT superiority, especially on balance. This study aims to determine RAGT efficacy on balance of post-stroke survivors.

Methods: PubMed, Cochrane Library, and PeDRO databases were used (the last online research were performed on August 3rd), considering all the articles published up to June 2022. Randomized clinical trials, evaluating RAGT efficacy on post-stroke survivor balance with Berg Balance Scale (BBS) or Timed Up and Go test (TUG) were included. Meta-regression analyses were performed, considering weekly sessions, single-session duration, and robotic device used. This research has been conducted following the PRISMA 2020 guidelines. The meta-analysis has been registered on PROSPERO (ID CRD42022348043).

Results: A total of 18 trials have been included. BBS pre-post treatment mean difference is higher in RAGT-treated patients, with a pMD of 2.17 (95 % CI 0.79; 3.55). TUG pre-post mean difference is in favor of RAGT, but not statistically, with a pMD of −0.62 (95%CI −3.66; 2.43). Meta-regression analyses showed no relevant association, except for TUG and treatment duration (β= −1.019, 95% CI −1.827; −0.210, p-value= 0.0135).

Conclusions: RAGT efficacy is equal to traditional therapy, while the combination of the two seems to lead to better outcomes than each individually performed. Robot-assisted balance training should be the focus of experimentation in the following years, given the great **Results** in the first available trials. Given the massive heterogeneity of included patients, trials with more strict inclusion criteria (especially time from stroke) must be performed to finally define if and when RAGT is superior to traditional therapy.

O002

Benefits of robot-assisted upper limb rehabilitation according to severity in the stroke patients: a multicenter randomized controlled trial

S. K. Bok (Daejeon/KR), H. W. Ryoo (Daejeon/KR), S. Y. Ahn (Daejeon/KR), J. Y. Lee (Daejeon/KR), S. Y. Lee (Daejeon/ KR), T. W. Kim (Daejeon/KR), H. Y. Lee (Daejeon/KR)

Objective: Rehabilitation after stroke aims to improve independence and quality of life through upper limb recovery.

Robot-assisted therapy involves the repetition of specialized functional tasks to enhance upper limb functions and activities of daily living. The present study was conducted to compare the clinical effectiveness of robot-assisted therapy using InMotion with that of conventional occupational therapy according to the severity of stroke.

Methods: In this multicenter randomized controlled trial at two centers in South Korea, subacute and chronic stroke patients (1 week to 5 years after the first stroke) aged ≥20 years and exhibiting upper limb dysfunction were randomized (1:1) to receive robot-assisted therapy or conventional occupational therapy. The robot-assisted training group received 30 minutes of robot-assisted therapy twice and 30 minutes of conventional occupational therapy daily, while the conventional therapy group received 90 minutes of occupational therapy daily. Therapy was conducted 5 days/week for 4 weeks. The primary outcome was the Wolf motor function test (WMFT) score after 4 and 8 weeks of therapy. The motor-evoked potential(MEP) and diffusion tensor imaging(DTI) was tested to evaluate brain plasticity.

Results: Overall, 113 and 115 patients received robot-assisted and conventional therapy, respectively. Based on the evidence provided by Fugl-Meyer Assessment, the scores 0 – 28, 29 – 42, and 43 – 66 were defined as the severe, moderate, and mild groups. Across all levels of severity, a significant

O002 Table 1. Demographic and clinical characteristics of patients

	Control (n = 89)	Treatment (n = 91)	*P* value
Age, mean ± SD, y	60.1±13.9	58.4±14.9	0.4317
Sex: male, No. (%)			
Male	56 (62.9)	62 (68.1)	0.5310
Female	33 (37.1)	29 (31.8)	
Side of lesion, No. (%)			
Lt.	52 (58.4)	48 (52.7)	0.4433
Rt.	37 (41.6)	43 (47.3)	
Type of stroke, No. (%)			
ICH	27 (30.3)	30 (33.0)	0.8110
SAH	2 (2.3)	1 (1.1)	
Infarction	50 (67.4)	60 (65.9)	
Onset, No. (%)			
Subacute	56 (62.9)	64 (70.3)	0.3435
Chronic	33 (37.1)	27 (29.7)	
Severity, No. (%)			
Mild	28 (31.5)	17 (18.7)	0.4924
Moderate	11 (12.3)	10 (11)	
Severe	50 (56.2)	64 (70.3)	
MMSE	22.13	21.70	0.764

P-value: t-test (continuous variables), chi-square test or Fisher' exact test (categorical variables)
*=statistically significant (P<0.05)

O002 Table 2. Between-group comparison of the pre/post treatment based on the severity

		Change = baseline - post	Mean ± SD	P value[1]	P value[2]
WMFT	Mild (n=45)	Control (n=28)	-2.93 ± 6.05	0.0019*	0.3829
		Treatment (n=17)	-4.59 ± 11.72	0.0457*	
	Moderate (n=21)	Control (n=11)	42.70 ± 20.96	0.0117*	0.4630
		Treatment (n=10)	-11.10 ± 13.92	0.0449*	
	Severe (n=114)	Control (n=50)	-7.56 ± 11.43	<0.0001*	0.4095
		Treatment (n=64)	-9.97 ± 15.34	<0.0001*	
MRC	Wrist Flexion	Mild (n=45)	Control	-0.18 ± 0.67	0.2734	0.8256
			Treatment	-0.29 ± 0.69	0.1875	
		Moderate (n=21)	Control	-0.30 ± 0.48	0.2500	0.0224*
			Treatment	-1.20 ± 0.79	0.0078*	
		Severe (n=114)	Control	-0.28 ± 0.61	0.0027*	0.5260
			Treatment	-0.20 ± 1.01	0.0746	
	Wrist Extension	Mild (n=45)	Control	-0.14 ± 0.65	0.3984	0.6642
			Treatment	-0.29 ± 0.69	0.1875	
		Moderate (n=21)	Control	-0.30 ± 0.67	0.500	0.0496*
			Treatment	-1.10 ± 0.88	0.0156*	
		Severe (n=114)	Control	-0.22 ± 0.62	0.0225*	0.6970
			Treatment	-0.27 ± 0.98	0.0099*	

improvement was detected after treatment in both the control group(CG) and the Robot-assisted training group(RATG), but no significant variation was observed among the intervention groups. For Medical Research Council Score(MRC), the level of significant improvement was greater in the severe stroke group than in the mild and moderate stroke groups for both the CG and the RATG. A significant improvement in wrist flex/extension muscle strength in the moderate group was observed for the RATG. For the neurophysiological test via MEP and DTI, the pre-/post-treatment test of each intervention group and the between-group comparison indicated no significant variation.

Conclusion: Although robot-assisted therapy did not significantly improve upper limb function in stroke patients compared with conventional therapy, it showed a slight increase of arm strength in moderate groups. The **Results** of this study are anticipated to serve as the basic data for future follow-up studies and provide evidence for the clinical application of upper limb rehabilitation robots.

O003

Activity patterns of patients six months after stroke – a subanalysis from the Phys-Stroke trial

T. Rackoll (Berlin/DE), T. Hinrichs (Berlin/DE), K. Neumann (Berlin/DE), B. Wolfarth (Berlin/DE), A. H. Nave (Berlin/DE)

Introduction: Secondary stroke prevention is an essential part of stroke care and includes pharmaceutical management of vascular risk factors as well as lifestyle changes. Physical activity is supposed to target multiple risk factors while increasing social participation. Still, little is known about how exercise interventions administered during inpatient stroke rehabilitation influences mobility and physical activity of patients after discharge.
Objectives: To evaluate effects of a structured aerobic exercise intervention on mobility, amount, and circadian rhythm of physical activity at six months after stroke.
Patients & methods: This is a secondary analysis of the Physical Fitness in Patients with Subacute Stroke (Phys-Stroke) trial. Moderate to severely affected stroke patients in the early subacute phase were rando
mized to receive either a four-week aerobic training or relaxation therapy intervention. At six months post stroke, the 6 min walking distance, seven-day accelerometry data, and **Results** from a physical activity questionnaire were recorded. Function on scalar regression was used to assess the circadian rhythm.
Results: Accelerometry data from all visits was available from 67 patients. At six months post stroke the mean number of steps were 5553 (SD 3005) per day. Patients spent 79**%** (SD 10) of their time being sedentary with less than 1.5 Mets. Patients were most active in the morning hours between 10 am to 3 pm. The amount and distribution of activity at six months did not differ between either treatment arms. Females were more active than men with the highest difference occurring around noon.
Conclusion: Stroke patients are physically less active six months post stroke than is recommended for secondary stroke prevention and patients spent most of the day sedentary. The **Results** imply post stroke inactivity is highly prevalent in stroke patients, despite a structured exercise program. Observed sex-differences in activity warrants further investigation.

O004

Corticospinal tract asymmetry leads to poor motor recovery immediately after ischemic stroke

M. Khan (Rochester, MN/US), G. Heredia (Grand Rapids, MI/US), L. Gallagher (Grand Rapids, MI/US), L. Packard (Grand Rapids, MI/US), D. Chesla (Grand Rapids, MI/US), J. Parker (Grand Rapids, MI/US), M. Edwardson (Washington, DC/US)

Background: Prediction of motor recovery after ischemic stroke is challenging. Corticospinal tract (CST) injury as assessed by advanced neuroimaging can have a major impact on motor recovery after stroke. Our study aimed to evaluate the impact of CST injury during acute phase on upper extremity motor recovery.
Methods: Adult patients presenting with upper extremity weakness due to acute ischemic stroke (0-5 days) between Jan 2019 to July 2022 were enrolled in the study. Patients underwent upper extremity Fugl-Meyer (UE-FM) during hos-

pitalization and again at 15, 30 and 90 days. CST injury was assessed using diffusion tensor imaging (DTI) performed 0-5 days of stroke onset. Differences in axial diffusivity (AD), radial diffusivity (RD) and fractional anisotropy (FA) of the ipsilesional CST relative to the contralesional CST were measured. Poor recovery was defined as a change in UE-FM of less than 10 points from day 0-5 to later time points. Categorical data was analyzed using Fishers Exact Test, numeric data was analyzed using two sample independent t-tests and numeric data not normally distributed was analyzed using Wilcoxon Rank Sum.

Results: A total of 21 patients (Age, 66 ± 14 years; Female 52.4%) were enrolled in the study. (Table) Baseline NIHSS was 5 [4, 5] and UE-FM was 42 [23, 53]. Baseline UE-FM was predictive of a 10-point change at 15 days (57 [47, 64] vs. 28 [18, 38]; p=0.0102), at 30 days (61 [50, 64] vs. 34 [28, 42] p=0.0165) but not at 90 days (57 [10, 64] vs. 31 [17, 42] p=0.4469). Ipsilesional FA did not predict recovery at 15 (p=0.5403) and 30 (p=0.1715) days. There was a trend towards lower ipsilesional FA values in patients with poor recovery at 90 days (0.61 [0.60, 0.62] vs. 0.63 [0.62, 0.66] p=0.0682). Those with greater CST asymmetry index (CST-AI) had less recovery at 15 days (0.04 [0.04, 0.04] vs. 0.01 [0.00, 0.02] p=0.0373) but not at 30 (p=0.1106) and 90 days (p=0.6485). All other DTI variables did not predict recovery.

Conclusions: Greater corticospinal tract injury as assessed by CST-AI led to less UE motor recovery at 15 days but not at 30 or 90 days. Early DTI in mildly impaired patients with a ceiling effect of UE-FM could explain our inability to detect a statistically significant change at 30 and 90 days. Further research is needed to evaluate tractography as a biomarker of stroke recovery.

References:

Hayward K, Ferris JK, Lohse KR et al. Observational Study of Neuroimaging Biomarkers of Severe Upper Limb Impairment After Stroke. Neurology. 2022 May 12;99(4):e402−13.

Lin DJ, Cloutier AM, Erler KS et al. Corticospinal Tract Injury Estimated From Acute Stroke Imaging Predicts Upper Extremity Motor Recovery After Stroke. Stroke. 2019 Dec;50(12):3569-3577.

O005

Bilateral proximal arm transplantation: functional results at two years

L. Huchon (Lyon/FR), A. Gazarian (Lyon/FR), L. Badet (Lyon/FR), E. Morelon (Lyon/FR), K. Reilly (Lyon/FR), S. Mateo (Lyon/FR), M. Charvin (Chalon sur Saône/FR), S. Lahlali (Lyon/FR), P. Petruzzo (Lyon/FR), G. Rode (Lyon/FR)

Introduction: Twenty-one years after the world's first bilateral hand transplantation, the first proximal arm transplantation, including reconstruction of one shoulder, was performed on January 2021 in Lyon (France).

Objective: To report the functional results of this transplantation 24 months after surgery.

Patient & methods: The recipient was a 48-year-old man with bilateral proximal upper-limb amputation following electrocution 23 years earlier. The surgical procedure consisted of a total arm transplantation on the left side with reconstruction of the gleno-humeral joint. On the right side, the donor's humerus was fixed to the 9 cm that remained of the patient's humerus. Nerve repair on the right occurred at the proximal nerve level and on the left at the secondary trunk of the axillary plexus. Both deltoid muscles were transplanted, non-innervated on the right side and used as the skin blood supply provider, innervated on the left side. Rehabilitation

O005 Table. Study population characteristics grouped by severity of upper extremity weakness

	Mild (UE-FM) > 45	Moderate (UE-FM) ≤ 45	P-value
	n= 9	n= 12	
Demographics			
Age, Mean SD, years	69 ± 17	63 ± 10	0.2928
Sex, n (%) Female	7 (77.8)	4 (33.3)	0.0805
Clinical			
UE-FM score (Baseline)	57 [49, 62]	26 [11, 35]	NA
DTI			
Infarct Volume (mL)	3.58 [0.90, 6.02]	2.86 [1.55, 3.67]	1.0000
CST-FA ipsilateral	0.63 [0.62, 0.65]	0.62 [0.61, 0.65]	0.4587
CST-FA contralateral	0.67 [0.64, 0.68]	0.66 [0.62, 0.67]	0.5602
CST-AI	0.02 [0.00, 0.04]	0.02 [0.01, 0.02]	1.0000
Axial Diffusivity ipsilateral	1.27 [1.19, 1.39]	1.15 [1.09, 1.32]	0.0903
Axial Diffusivity contralateral	1.32 [1.26, 1.43]	1.25 [1.24, 1.25]	0.0567
AD-AI	0.01 [-0.01, 0.05]	0.05 [0.00, 0.07]	0.3408
Radial Diffusivity ipsilateral	0.41 [0.37, 0.44]	0.39 [0.34, 0.41]	0.3143
Radial Diffusivity contralateral	0.40 [0.37, 0.42]	0.37 [0.36, 0.42]	0.7508
RD-AI	-0.01 [-0.02, -0.01]	0.02 [-0.01, 0.04]	0.0903
Mean Diffusivity ipsilateral	0.71 [0.64, 0.75]	0.68 [0.58, 0.70]	0.1245
Mean Diffusivity contralateral	0.69 [0.68, 0.76]	0.66 [0.65, 0.70]	0.2037
MD-AI	0.00 [-0.02, 0.03]	0.04 [0.00, 0.07]	0.1688

started on day 1, and progressively increased across time. It included manual lymphatic drainage, passive motion of all joints using their full range (except the shoulders which were limited for 6 weeks), electrostimulation on denervated and then innervated muscles programs, hand therapy, physiotherapy, occupational therapy, psychomotricity, physical activities, visuomotor simulation training approaches (motor imagery, virtual mirror therapy, virtual reality).

Results: No severe complications (threatening the patient or his arms' vital prognoses) occurred during the post-operative course. 24 months after the procedure, the patient is in good general condition and his capacity to perform activities of daily life is better than before the graft (Functional Independence Measure 109/126, DASH score 50,8/100). The passive range of motion of both upper limbs is subnormal. On the right, strength is 3 to 4/5 according to the MRC scale for almost all muscles, except the intrinsic hand muscles which are 0/5. On the left side, strength ranges from 1 to 4/5, except the intrinsic hand muscles which are 0/5. Sensitivity is patchy. The patient feels the 4.56 Semmes-Weinstein monofilament on the palm of his right hand and the 6.65 on the palm of his left hand. Thermal sensitivity is reliable

on the left hand but not the right. 15 mm two-point static discrimination is present on some distal right phalanges. The patient can perform manual prehension for small and light objects with both hands, and uses mono or bi-manual prehension in daily life activities. He has improved significantly in all his main functional objectives, is globally satisfied with his arms, and his quality of life and his body image are greatly improved. The patient's main complaints are pain (instability of right shoulder and cervical muscular contractures) and tiredness.

Conclusion: Bilateral proximal arm transplantation is feasible and valuable for restoring body image, quality of life and some arm function in bilateral arm amputees.

O006

Deep cerebellar electrical stimulation to enhance chronic, post-stroke motor rehabilitation: Phase I, 10-month follow-up data

K. Baker (Cleveland, OH/US), A. Machado (Cleveland, OH/US)

Background: We previously reported positive preliminary **Results** supporting the safety, feasibility, and preliminary efficacy of deep brain stimulation (DBS) of the dentate nucleus (DN) on motor rehabilitation as part of an open-label, non-randomized phase I trial.
Objective: We now present the complete trial results, including 10-month, post-explant, long-term follow-up data.
Methods: Patients with chronic, moderate-to-severe upper-extremity motor deficits underwent implantation of an 8-chan-

nel DBS lead targeting the contralesional DN as part of an 18–22-month safety/feasibility trial that included up to eight months of chronic DN DBS combined with rehabilitation. Thereafter, the DBS hardware was explanted and patients were followed for an additional eight months without continued rehabilitation. Adverse events, including serious safety events, device-related events and unanticipated events were monitored across the entire trial and response to treatment (MCID) was defined as a 5-point improvement in the FM-UE.
Results: Twelve patients completed the study, with no device failures and no study-related, serious adverse events. A total of 51 adverse events were recorded over the course of the trial, including 21 deemed related to study participation. Participants showed a 7-point median improvement in FM-UE scores in response to DN DBS combined with rehabilitation, with 9 of 12 (75**%**) exceeding MCID. All individuals who enrolled with partial preservation of distal motor function exceeded minimal clinically important difference regardless of time since stroke, with a median improvement of 15 FM-UE points. At long-term follow-up, ten months after deactivation of the stimulation device, the median FM-UE score for the full cohort remained unchanged relative to post-treatment scores, supporting the durability of previously-realized, treatment-related gains. Functional gains were directly correlated with cortical reorganization evidenced by increased ipsilesional metabolism.
Conclusion: Our preliminary, open-label results support DN DBS as a promising treatment for patients with post-stroke hemiparesis with enduring benefits for treated individuals.

O007

Enhancement of Stroke Rehabilitation with Levodopa (ESTREL-study) – progress of the ongoing multicenter placebo-controlled randomized trial

S. Engelter (Basel/CH), A. Zietz (Basel/CH), A. Polymeris (Basel/CH), K. Wiesner (Basel/CH), L. Nussbaumer (Basel/CH), S. Fischer (Basel/CH), J. Jost (Basel/CH), M. Wiegert (Basel/CH), V. Altersberger (Basel/CH), J. Kaufmann (Basel/CH), S. Schaedelin (Basel/CH), R. Müri (Bern/CH), L. Hemkens (Basel/CH, Stanford, CA/US, Berlin/DE), P. Michel (Lausanne/CH), J. Held (Zurich/CH, Zurich/CH), P. Lyrer (Basel/CH), G. Ford (Oxford/GB), A. Luft (Zurich/CH, Vitznau/CH), C. Traenka (Basel/CH)

Background and aim: The ESTREL trial investigates whether Levodopa given in addition to usual rehabilitative therapies **Results** in a patient-relevant enhancement of motor recovery after acute stroke.
Methods: ESTREL (Enhancement of Stroke REhabilitation with Levodopa) is a multicenter, placebo-controlled, double-blind randomized superiority trial. Patients with an acute ischemic or hemorrhagic stroke and disabling hemiparesis requiring in-hospital rehabilitation are enrolled in 12 acute care centers within 7 days onset and later transferred to neurorehabilitation centers. Participants receive Levodopa 100mg/Carbidopa 25mg three times daily or matching placebo for 5 weeks in addition to standardized rehabilitative therapy. The primary outcome is the in between-difference of the Fugl-Meyer-Motor Assessment score 3 months after randomization. We present the characteristics of the first 400 of 610 patients to be enrolled.
Results: 338 patients (84.5**%**) had an ischemic stroke. Participants had a median age of 73 [IQR 63–82] years and 40.8**%**
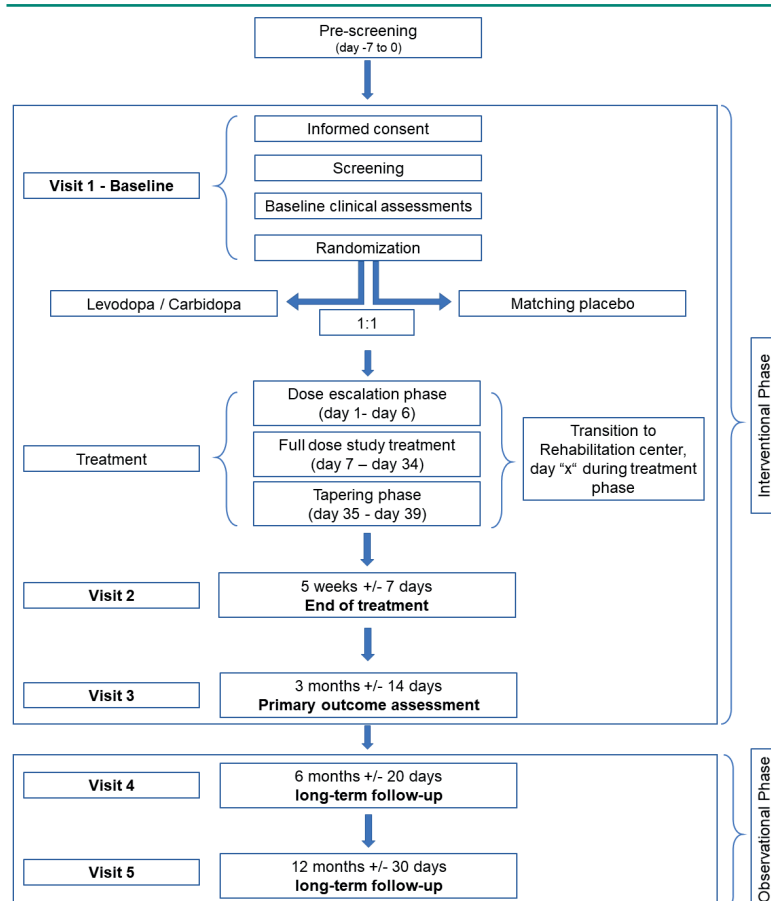
O007 Fig. 1

were female. At baseline, the median NIH-Stroke scale score was 8 [5–10]. Three month visits were performed in 369 patients (92.2%); 19 (4.75) died before the 90-days-visit, 9 (2.5%) withdrew from the study and 3 patients missed the clinical visit.

Conclusions: The ESTREL study progresses successfully and few patients are withdrawing. This large trial in the field of neurorehabilitation will provide evidence whether the additional use of Levodopa in stroke rehabilitation is safe and effective.

O008

The therapeutic effect of tACS in language impairment in people living with chronic post-stroke aphasia

N. Dimitriou (Ioannina/GR), A. Nousia (Kalamata/GR), M. Martzoukou (Thessaloniki/GR), M. Renaud d' Ambra (Montpellier/FR), A. Aksenov (Montpellier/FR), V. Volpert (Montpellier/FR, Lyon/FR), A. Beuter (Montpellier/FR), G. Nasios (Ioannina/GR)

Introduction: More than 30% of stroke victims suffer from aphasia. In 50% of cases, disabling difficulties still exist six months after the stroke (chronic phase). The prognosis for improvement by the traditional methods, such as intensive speech therapy, then becomes slow and limited. On the other hand, noninvasive stimulation-based treatments show great promise in relieving neurologic disorders. More specifically, transcranial alternating current stimulation (tACS) has proven to be a powerful supplementary tool added to speech and language therapy, since it has demonstrated great contribution in brain plasticity.

Objectives: The aim of present study was to investigate the effect of tACS in language impairment in patients who live with chronic aphasia after stroke.

Patients & methods: To treat chronic aphasia, the strategy proposed in this study was based on an experimental design of type "N-of-1" and more specifically a Single-Case Experimental Design (SCED). This is a personalized method that enables each patient to be his/her own control-subject, thus it overcomes some of the main methodological biases in clinical research (e.g., population size, heterogeneity, control groups).We utilized a combined strategy of naming sessions with tACS stimulation and pure naming sessions without stimulation on 2 patients for 8 weeks. Each patient underwent a speech language assessment before the treatment and one after, with the Boston Aphasia Assessment Test and some extra pictures for naming verbs and nouns. In addition, an analysis of electroencephalogram (EEG) signals proceeded before the start of the treatment, every 2 weeks during the treatment and at the end of it. We determined appropriate personalized parameters (intensity, frequency and exact location) for the stimulation, according to the initial EEG measurements. Finally, we investigated various parameters, such as the number of correct answers, the categorization of errors (semantic or phonological) and the naming latency (time between the appearance of the image and the detection of the subject's voice).

Results: Based on the observation of the alternating pattern that occurs in patients -but not in control subjects- we hypothesized that tACS could improve the subjects' scores by reinforcing this alternating pattern. Indeed, by the end of the 8-weeks treatment both patients displayed improvement
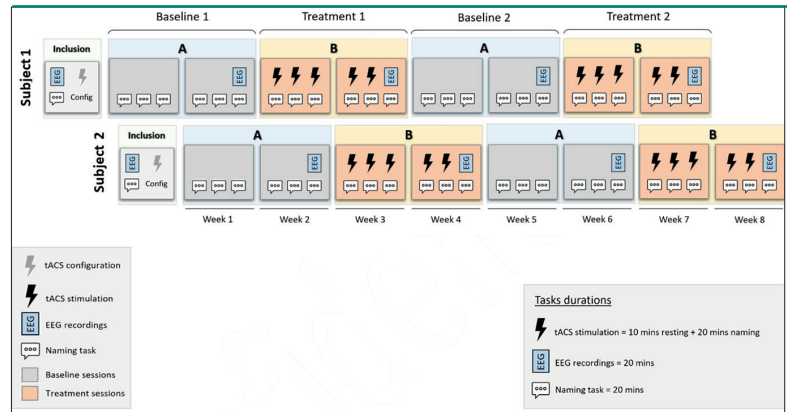
O008 Fig. 1

in final speech-language assessment and increased number of correct answers and faster answers in final EEG session.

Conclusion: In Conclusion, tACS with personalized parameters is a very promising tool for chronic aphasia rehabilitation that can be applied in routine rehabilitation therapies, since the device is portable, low-priced and has shown the least amount of side effects.

O009

T.E.D.R.A.S.-Trial (Transesophageal Echocardiography: Dysphagia Risk in the Acute Phase After Stroke) – Follow up

S. Hamzic (Giessen/DE), M. Juenemann (Giessen/DE), M. Butz (Giessen/DE), J. Wagner-Doerr (Giessen/DE), T. Braun (Giessen/DE)

Background: Dysphagia is a common consequence from stroke and it correlates with an increased risk of aspiration pneumonia and an increased mortality risk. Early detection of dysphagia increases the overall outcome, reduces the mortality risk, the risk of aspiration pneumonia, malnutrition as well as the length of hospitalization and the overall costs of treatment.

In German stroke units patients undergo a clinical swallowing screening and the flexible endoscopic evaluation of swallowing (FEES), if necessary. FEES is valid assessment of swallowing and description of dysphagia symptoms via standardized scores. Transesophageal echocardiography (TEE) is conducted within the first few days as a routine diagnostic work-up of stroke. The implementation of a TEE during cardiac surgery has a significant correlation with occurrences of postoperative dysphagia.TEDRAS-Trial (Transesophageal Echocardiography: Dysphagia Risk in the Acute Phase After Stroke; ClinTrial.gov identifier NCT04302883) was the first randomized and controlled trial to address the question of the extent to which TEE increases dysphagia risk in acute stroke patients. The **Results** of the study confirmed the hypothesis that dysphagia severity worsens after TEE in the intervention group

Objective: The aim of the prospective observational TEDRAS – Follow-up Trial is to investigate the limitations of the initial TEDRAS-Trial in patients with acute ischemic stroke.In particular, the following parameters will be examined: 1) The influence of the type and route (intravenous vs. oral) of anesthesia administered during TEE on swallowing in all cohorts studied; 2) The correlation between the dura-

| Stage 1 | Examination of anatomical structures + secretion rating |

Secretion rating (SSRS, PAS, YPRSS) → SSRS 3 / PAS 7-8 / YPRSS → Abort

SSRS 0-2 / PAS 1-6 / YPRSS

| Stage 2 | Swallow examination |

Three teaspoons - water → PAS 7-8 → Abort

PAS 1-6

Three sips - water → PAS 7-8 → Abort

PAS 1-6

Serial swallow - water → PAS 7-8 → Abort

PAS 1-6

Three teaspoons - puree → PAS 7-8 → Abort

PAS 1-6

Three bits - bread

| Stage 3 | FOIS-G rating and decision on oral diet based upon symptoms evaluation |

O0009 Fig. 1

tion of TEE and the degree of deterioration in FOIS-G after TEE.; 3) The interrater reliability for the FEES.

Methods: This prospective observational trial is conducted at the stroke unit of the Department of Neurology at the University Medical Centre Giessen, Germany. Procedures were approved by the Ethics Committee at the Justus Liebig University Giessen. Following inclusion criteria are to be met: (1) acute stroke; (2) written informed consent; (3) indication for TEE. Exclusion criteria are: (1) brain hemorrhage; (2) pre-existing neurogenic dysphagia (3) surgery and/or radio-chemo-therapy for tumors in the head and neck region; (4) dementia; (5) aphasia; (6) cervical spine surgery; (7) thyroid gland surgery; (8) acute delirium; (9) lack of compliance; (10) lack of alertness. We intend to include 40 patients.

Discussion: TEDRAS - Follow Up will examine the underlying symptoms of dysphagia found in the initial trial. We hypothesized that mechanical irritation of the pharyngolaryngeal mucosa by TEE probe cause stronger salivation, damage peripheral sensation and negatively impact tongue posterior thrust, pharyngeal squeeze and laryngeal elevation. We hypothesize that the TEE probe applies a too high pressure to oral, pharyngeal and laryngeal tissues.

O010

Comprehensive assessment of motor imagery ability after stroke: a control-case series study

J. Holé (Lyon/FR), K. Reilly (Lyon/FR), C. Collet (Lyon/FR), G. Rode (Lyon/FR), S. Mateo (Lyon/FR)

Background: Stroke causes sensory-motor deficits limiting activities and restricting participation. Motor imagery have been repeatedly used and is recommended during rehabilitation to limit the potential dramatical consequences of stroke. But one faces the multiple MI characteristics' i.e., explicit (questionnaires administration) or implicit (hand laterality judgment task, HLJT), perspectives (first or

third), modalities (visual or kinaesthetic) which may limit its implementation up to no training in case of insufficient MI abilities. To date, no study performed a comprehensive assessment of MI ability after stroke.

Objectives: To comprehensively assess both the explicit and implicit MI ability after stroke with and with no neglect as compared to healthy age- gender-matched individuals.

Method: Single-center non-randomized controlled trial (clinicaltrial.gov number: NCT03661073) assessing implicit MI using HLJT and explicit MI using 3 questionnaires (Kinaesthetic and Visual Questionnaire (KVIQ), Vividness of Movement Imagery Questionnaire (VMIQ) and Movement Imagery Questionnaire (MIQ-RS)) and using 2 mental chronometry tests (imagined Box and Block Test (iBBT) and imagined Timed Up and Go test (iTUG)). Implicit MI outcomes were the correct responses (in %, correctness) and response time (RT). Explicit MI outcomes were the vividness score (1-5 for KVIQ, VMIQ, iBBT and iTUG, 1-7 for MIQ), imagined/executed time ratio (I/E ratio for iBBT, iTUG, KVIQ and MIQ). Each assessment was measured once. Data were analysed with R (4.2.1) using one way ANOVA to compare outcomes between 3 groups (stroke and neglect, stroke, controls) and in case significant differences were found ($p<0.05$), Tukey post-hoc correcting for multiple tests. Data were reported as mean, ±SD, [95%CI].

Results: A total of 48 individuals were included representing 24 participants with stroke (age 50±14y, n=8 with neglect) and 24 healthy control individuals (age 50±13y). Implicit MI ability was significantly impaired after stroke; compared to controls 91±6% correctness decreased by 12% [-20; -4] after stroke and by 24% [-34; -13] with neglect; 2069±861ms RT increased by 928ms [-87; 1943] after stroke and 3069ms [1785; 4354] with neglect. Explicit MI showed spared MI ability with no significant differences for iBBT (mean across groups vividness=3.8±0.9 and I/E ratio=1.1±0.5), for iTUG (3.7±0.7; 1.0±0.4), for KVIQ (3.8±0.8), for VMIQ (3.7±0.6), and for MIQ (5.2±1.0). Nevertheless, I/E ratio was significantly increased in case of neglect (KVIQ: 2.1±1.2; MIQ: 1.5±0.9) vs stroke (only for KVIQ -0.7[-1.2; -0.2]; but not MIQ:-0.2 [-0.7; 0.2]) and vs control (KVIQ:-0.9 [-1.4; -0.4]; MIQ:-0.4 [-0.8; -0.1].

Discussion: These results suggest that explicit MI ability is mainly spared after stroke with a possible strategy of slowing MI (increase of I/E ratio) to maintain high MI accuracy (vividness). Attention should be paid for implicit MI after stroke in particular with associated neglect.

O011

Results of an executive function-training program coupled with transcranial stimulation in chronic brain-injured patient

X. de Boissezon (Toulouse/FR), C. Lebely (Toulouse/FR), S. Scannella (Toulouse/FR)

Background and aims: Cognitive remediations (CR) are designed to address the crucial need for symptom improvement in acquired brain injury patients with deficit in executive functions. The aim of our study is to investigate a CR in virtual reality (CoVirtua), coupled with a transcranial stimulation session (tRNS), to improve performance in ecological situations of brain damaged patients with dysexecutive syndrome.

Methods: Fifteen patients were included in this multiple single case study (SCED). Three phases A1-B-A2 followed each

other over 12 weeks. Phases A1 and A2 correspond to conventional occupational therapy and phase B corresponds to the intervention under study. The start of phase B is randomised (multiple baselines). The intervention lasts four weeks and consists of four Covirtua sessions per week, each coupled with a 20-minute tRNS session (1 active electrode in the right dorsolateral prefrontal cortex and 4 return electrodes, maximum intensity 1 mA). The effect of the intervention is assessed by the Goal Attainment Scale (GAS) in the short and long term (3 goals defined per patient).

Results: Among the included participants, 3 achieved at least their short-term goals (A1 vs B): 2 Objectives for P01 ("Mailbox management" p= 0.004; "Concentration" p = 0.002); 1 Objective for P03 ("Managing a shopping list" p=0.001) and 1 Objective for P12 ("Improving divided attention" p=0.047). A positive and significant long-term effect (A1 vs B+A2) was found for 8 patients who achieved at least 1 of their goals one month after the end of the intervention:

- 2 Objectives for 2 patients (P01 "Mailbox management" p= 0.02; "Concentration" p=0.001 and P06 "Following a recipe" p=0.005; "Managing groceries" p=0.02)
- 1 Objective for 6 patients (P02 "Following a household chores schedule" p=0.03, P03 "Managing a shopping list" p=0.001, P07 "Gardening activity" p=0.02, P12 "Improving divided attention" p=0.002, P13 "Retain a sequence of 4 actions in order" p=0.043 and P14 "Improve speed of execution" p=0.013)

Conclusion: This study showed moderate **Results** but suggest that the cognitive training coupled with brain stimulation could improve behavioral performance at long-term in some dysexecutive patients in chronic phase.

O012

Cognitive, psychological and occupational aspects after aneurysmal subarachnoid hemorrhage in a French university hospital: a retrospective cohort study

C. Devignes (Lyon/FR), J. Luauté (Lyon/FR), F. Dailler (Lyon/FR), H. Ardaillon (Lyon/FR), T. Ritzenthaler (Lyon/FR)

Introduction: Aneurysmal subarachnoid hemorrhage (SAH) is an uncommon type of stroke (1-6**%**), caused by bleeding in the meningeal spaces. Mortality and severe morbidity have declined with progress in prevention and management in the acute phase. SAH mainly affects young people and alterations in quality of life often persist, preventing subjects from returning to previous daily life, despite a good motor recovery. Long-term cognitive, psychological and social prognosis after SAH have been poorly studied. To our knowledge, only one French study has described the functional evolution at one year post-SAH, focusing only on autonomy assessment using the modified Rankin scale (mRS) (Cinotti, 2019).

In our neurological university hospital in Lyon, survivors of SAH have been systematically seen around month 7 after the ictus for a multidisciplinary appointment by a PMR physician, a neuropsychologist and a pharmacist.

Methods: In this retrospective cohort study, medical records of SAH survivors from neurological intensive care between 2016 and 2022 were analysed. Patients with an available Montreal Cognitive Assessment score (MoCA) were included, to determine the prevalence of cognitive disorders (main **Objective**). MoCA subscores, Post-traumatic stress disorder

Checklist Scale (PCLS), mRS, professional status were also collected. We performed multivariate analyses to determine prognostic factors associated with poor cognitive recovery or return to work rate.

Results: From 07.12.2016 to 01.06.2022, 787 patients with aneurysmal SAH were hospitalized in ICU. Among all alive patients discharged (659), 305 patients had an available MoCA score (at median day 219). Among them, 70**%** had a good functional status (mRS ≤ 2). Forty-five percent had an impaired MoCA score (<26) with the most impacted tasks being memory and executive functions (i.e., recall [76**%**] and verbal fluency [48**%**]). Then, 26**%** had a PCLS score in favor of post-traumatic stress disorder. Among the 62**%** who used to work before the stroke, 33**%** were still on sick leave, 22**%** resumed work with an adjusted schedule, and 17**%** full-time. Risk factors associated with return to work rate were baseline severity and a pathological PCLS score. Factors associated with poor MoCA score were age, a high-grade SAH and mRS score at discharge from ICU.

Discussion: Cognitive disorders are common and underestimated in survivors of SAH, despite a good neurological evolution on mRS. We hypothesized that impairments in executive tasks could be linked both to SAH but also to the PTSD component. These psychological aspects could impair professional recovery and should not be neglected. Performing an early and systematic clinical screening of patients after ICU discharge could improve early management and reduce burdens and long-term deficits.

O013

Tablet-based interventions for cognitive and language impairments in neurorehabilitation: evidence for universal benefits

T. Bloder (Vienna/AT), M. Zusag (Vienna/AT), M. S. Müller-Mezin (Vienna/AT), L. Wagner (Vienna/AT), P. Schöllauf (Vienna/AT,)

Introduction: Successful neurorehabilitation after a brain injury requires a high degree of individuality. Therapy contents must be adapted to each patient's individual symptoms and their respective severity (Jokinen et al., 2015). There is substantial evidence of positive effects of tablet-based interventions (Des Roches et al., 2015; Lavioe et al., 2019; Godlove et al., 2019; Choi et al., 2016) suggesting that modern-day technologies are successful in delivering systematic therapy that is tailored to each patient's individual needs. Although severity is considered a negative prognostic indicator for successful rehabilitation outcomes (Pedersen et al., 2004), Kiran (2016) showed that, in fact, patients with more severe aphasia have greater potential for improvement given that they receive appropriate treatment. What remains unexplored is how the usage of digital therapy contents changes in patients with acquired brain damage in relation to the severity of their impairment and how this impacts their progress.

Objectives: In the current study, the "real-world" course of a self-administered tablet-based therapy was documented using the new smart tablet app myReha developed for the German-speaking context. Therapy intensity and perfor-

mance progress over the course of 8 weeks were measured and evaluated in relation to impairment severity.

Patients & Methods: 137 patients with acquired brain damage participated in the study. Over the course of 8 weeks, participants used the myReha app, which provides a therapy regimen that dynamically and automatically adapts to a patient's abilities and the progress they make. Individualized artificial intelligence-based feedback supports patients in completing the exercises.

Results: Overall, more severely impaired patients tend to require a greater amount of time to overcome their difficulties than participants with less severe impairment. They also need more time to complete a task compared to moderately and mildly impaired patients (0.24 vs. 0.12 minutes). Still, over the course of 8 weeks, they completed a greater amount of tasks per week than patients with moderate and mild impairment (318 vs. 228 tasks/week). After 8 weeks, the different severity groups showed significantly varying degrees of improvement; $F(1,100)=12.720$, $p < .001$). However, more generally, significant progress was observed across all groups; $F(1,100)=17.012$, $p < .001$).

Conclusion: The use of smart tablet-based interventions, enables patients to control the intensity of their therapy regimen and adjust it to their personal needs, allowing them to maximize their rehabilitation potential. The use of digital tablet-based intervention **Methods**, specifically the myReha app for neurological patients, thus, is an efficient option for an effective, long-term and intensive continuation/maintenance of individual neurorehabilitation across all severity levels.

O014

Individual and coordinated finger movements decoding from high-density EEG and its implication in hand exoskeleton control

Q. Sun (Leuven/BE), A. Faes (Leuven/BE), M. Van Hulle (Leuven/BE)

Background: Restoring hand functionality of paralyzed patients, such as those suffering from stroke, progressive disorders, or even spinal cord injuries, is essential to increase their self-reliance in activities of daily life. As brain-computer interfaces (BCIs) decode brain activity directly, bypassing defective neural pathways, they have been hailed as a solution. BCI-controlled hand exoskeletons, especially when based on non-invasive EEG recordings, hold great potential to improve or restore finger dexterity of paralyzed individuals. However, finger movement decoding from EEG is less investigated in literature.

Objectives: We investigate the feasibility of decoding performed individual and coordinated finger movements from one hand using high-density EEG and how the gained insights could benefit the online control of a hand exoskeleton.

Methods: Four healthy subjects (3 right-handed) were recruited and asked to perform 8 cued finger movement scenarios: 5 individual finger movements and 3 coordinated ones, i.e., pinch, three-finger pinch, and grasp. During task performance, we recorded their hdEEG signals using 62 active electrodes covering the contralateral brain regions of the dominant hand. Their hand activities were also recorded with a 5DT Data Glove Ultra.

Results: The results showed that: 1) pairs of finger movement scenario's could be differentiated using power features in the 8–30 Hz frequency band and a linear support vector machine classifier after movement onset, of which the coordinated finger movements scenario's enjoyed the largest differentiability. For example, the pairwise classification accuracies between grasp and the two pinch movement scenario's were about 80**%**, while those between pairs of individual finger movement scenario's were just above chance level (50**%**); 2) the movement-related cortical potentials (MRCPs) in the 0.3–3Hz range exhibited a sharp decrease starting -0.5 s before the onset of finger movement and rebound after onset, but its characteristics are subject- and movement scenario-specific. The difference in MRCPs of single finger movements turned out to be insignificant, making it difficult to classify them individually, which is at odds with an article that claimed the opposite.

Conclusion: The onset of finger movement can be detected from MRCP-based features and this could be a good solution to solve the latency problem during online hand exoskeleton control. Fine finger movements, such as the ones considered in this study, are difficult to be distinguish from one another, calling for more in-depth feature engineering.

O015

How can innovative technologies optimize motor recovery in neurorehabilitation? A practical model for the upper limb post-stroke rehabilitation

H. Bessaguet (Saint Etienne/FR), A. Ahmed (Saint Etienne/FR), P. Giraux (Saint Etienne/FR), D. Luneau (Saint Etienne/FR), E. Ojardias (Saint Etienne/FR)

Introduction: Several models have been proposed to explain overall motor control functioning in healthy subjects and patients. These models have subsequently been transposed to define guidelines for early neurorehabilitation after stroke. Recent developments in neuro-engineering have given us new modern tools for rehabilitation, but the combined approaches remain complex to implement in clinical practice.

Objectives: The objectives were to design a practical model for upper limb post-stroke rehabilitation and to implement it in current clinical pathways.

Materials & methods: A narrative review was conducted on the best evidence-based rehabilitation approaches. Studies related to the management of post-stroke hemiplegic adult patients were included. We focused on the patient's pathways and efficacy applicated to upper limb motor recovery. Searches were performed in MEDLINE, PubMed, Web of Science, EMBASE and Google Scholar.

Results: Based on a laboratory concept, where various tools can be used on the bench, the model we designed combines complementary methods of assessment and rehabilitation. We have focused our model on functional recovery of the upper limbs. Functioning as a technological toolbox, the "Arm-Lab" should therefore integrate techniques that can be implemented indiscriminately, depending on impairments, activity limitation and social participation according to the dimensions of ICF. We believe that these conditions should be met to optimize motor re-learning:

1) The "Arm-Lab" should be supervised by a qualified professional to ensure safe and effective use.

2) It should be based on intensive rehabilitation to stimulate neuroplasticity

3) It should be based on a multimodal approach using motion sensors, mirror therapy, video therapy, robotics (i.e exoskeletons, weight compensation), virtual reality, or functional orthosis, potentialized by focal muscle vibrations, central (tDCS, rTMS) and peripheral (FES) neuromodulation techniques.

4) It should include early interventions, focused on passive/active mobility, grasping, sensory stimulation and oriented tasks with object handling.

5) It should comprise regular assessments to tailor interventions to patients' needs.

6) It should incorporate the patient's neuropsychological aspects, to optimize learning reinforcement and treatment adhesion.

Conclusions: The increasing use of innovative tools in rehabilitation centres and the combination of approaches allow for the intensification and personalization of patients' treatments. This should open the way for new research programs on the effectiveness of care programs and not only on each isolated rehabilitation technique's efficacy.

O016

Health care support for a fragile population with targeted remote telerehabilitation: an ongoing study

J. Petioky (Kladruby u Vlasimi/CZ), M. Lippertova-Grunerova (Prague/CZ), A. Duris (Kladruby u Vlasimi/CZ), K. Hoidekrova (Kladruby u Vlasimi/CZ, Prague/CZ)

Introduction: Fragile population (elderly people or people with disabilities) can often be isolated in their own social environment. They lack of social interaction and activities. They also suffer from progressive deconditioning with a risk of limitation of functional independence and decline in cognitive abilities which are important for normal interactions with the outside world. While social and healthcare institutions have basic staff to provide care for their patients, they already have a deficit of staff for developmental or special long-term activities and facilitation for their patients. Our distance cooperation with residential social and health-social facilities includes telerehabilitation activation and supports the local community of their patients.

Methods: Our target group is a fragile population with serious health problems (injuries, surgeries, strokes, congenital and progressive neuromuscular diseases, and cognitive impairment). Our study is focused on group-targeted telerehabilitation in combination with locally provided support from an activation worker. We divide the probands into three groups, a high-functioning group (walking subjects, age 84.6 years (±9.8)), a low-functioning group (wheelchair users, standing instability, age 81,6 years (±8,2)) and a cognitive impartment group (mild to moderate cognitive limits, age 85,1 years (±7,4)). The therapy is provided once per week (each group), 15–20 mins. Telerehabilitation includes physical exercises with elements of reminiscence therapy and activities of daily living (ADL).

Outcomes: 580 patients have participated in telerehabilitation. Telerehabilitation is well received by elderly individuals and it brought rehabilitation benefits: adjustable image and sound compensated auditory and visual impairments. The combination of physical exercises with elements of reminiscence and simulation of ADL is simple and very easy to understand for the elderly population.

Conclusion: Data collection is still ongoing and individual groups are being supplemented. We are able to provide professionally guided rehabilitation even in rural facilities thanks to remote monitoring. Regular follow-up of the probands is very important because over time there are changes in the functional or cognitive state, which subsequently leads to the migration of the probands into individual groups. We believe that by registering for this program we will help stimulate the patient's activity.

O017

Grasping rehabilitation using motor imagery with and with no neurofeedback after tetraplegia: a study protocol and preliminary neurophysiological analysis

G. Charbonnier (Lyon/FR, Lyon/FR), K. Reilly (Lyon/FR), D. Schwartz (Lyon/FR), S. Daligault (Lyon/FR), J. Luauté (Lyon/ FR, Lyon/FR), Y. Rossetti (Lyon/FR, Lyon/FR), C. Collet (Lyon/FR), A. Gellis (Montpellier/FR), G. Rode (Lyon/FR, Lyon/FR), S. Mateo (Lyon/FR, Lyon/FR, Lyon/FR)

Tetraplegia causes extensive sensorimotor deficits perturbing grasping, activity, participation and quality of life. Individuals with C6–C7 tetraplegia recover tenodesis grasping using their wrist extension with rehabilitation. To date, non-randomized study showed that motor imagery (MI) added to rehabilitation significantly improved the tenodesis grasp. It is hypothesized that grasping could be further improved using visual neurofeedback (NF) during MI.

Aims: to evaluate with an appropriate methodology the contribution of MI and NF for the rehabilitation of grip after C6–C7 tetraplegia and to investigate neuronal activity modification following the implementation of these techniques.

Method: we proposed a bicentric, assessor-blind, random controlled trial to investigate the training effectiveness of MI with NF, MI alone or visualization on grasping function after a C–C7 tetraplegia. 21 stable C6–C7 SCI inpatients will be equitably and randomly divided in 3 groups: i) mental visualization of movie and geometric shapes (control group), ii) motor imagery alone (MI group), and iii) motor imagery combined with neurofeedback (MI-NF group). Intervention will consist on 45 minutes session, three times a week for five weeks. Each group will follow the same conventional rehabilitation program during the whole study time. First outcome will be wrist extension angle during grasping measured by 3D motion analysis system. Secondary outcomes will evaluate grip strength, ability to imagine movement, activity and quality of life. The outcomes capture the whole aspects of the International Classification of Functioning (WHO) (deficits, activity and participation). Brain activity will be explored for each group using a 32-channel EEG. We performed spatial analysis (topographic distribution of alpha and beta band activity during intervention), frequency analysis (power spectral density evolution during intervention), and time frequency analysis (modification in terms of event related synchronization / desynchronization during intervention) using MNE Python.

Preliminary results: to date, 5 patients have been included and completed the study. Preliminary analysis of the neurophysiological data collected (offline analysis of EEG signals) have been performed. Power spectral density analysis and time-frequency analysis show a reinforcement of the power in alpha and beta bands, and an enhancement of event related desynchronization/synchronization over the senso-
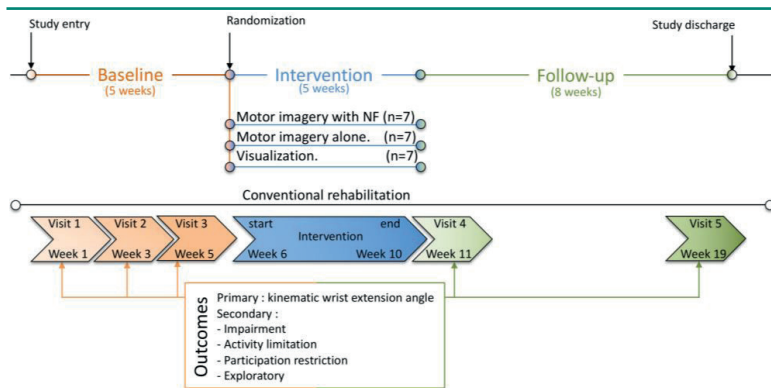
Figure 1: Study timeline. Secondary measures consisted in assessing impairments (kinematic grip strength, upper lim range of motion, upper extremity strength using both the manual muscle test (MMT) and a hand held dynamome activity limitations (kinematic spatio-temporal parameters, Box and Block Test, Nine Hole peg Test, capabilities of u short form of the quadriplegic index of function) and participation restriction (World Health Organization Quality o This will be completed by exploratory measures (Kinesthetic and Visual Imagery Questionnaire, neurophysiologica EEG recordings).
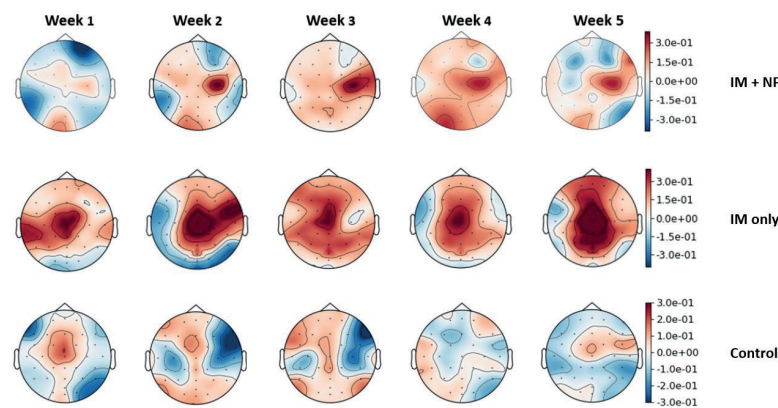
O017 Fig. 1. Study timeline

Figure 2: evolution of topography of power distribution in the alpha and beta frequency bands (8-30Hz) during intervention for the considered task (i.e., IM + NF, IM only, or visualization of geometric shapes). Results are presented in percentage relative to baseline (1 second before starting the task). In red: increase of the power in the frequency bands considered in comparison with baseline. In blue, decrease of the power in the frequency band compared to baseline.

O017 Fig. 2

rimotor cortex in the intervention groups (MI and MI-NF) between first and last week of intervention.

Conclusion: this protocol is designed to investigate with an appropriate methodology the contribution of MI and NF for tenodesis grasp rehabilitation in C6-C7 tetraplegic patients. The preliminary **Results** conducted on neurophysiological data recorded in patients who have already completed the study suggest that NF could reinforce neuronal activity modification induced by IM over the sensorimotor cortex.

O018

A pilot study to explore the feasibility of a localised virtual reality cognitive rehabilitation programme for stroke survivors in Singapore

S. Wei (Singapore/SG), A. P. X. Tan (Singapore/SG), A. L. Teoh (Singapore/SG), T. A. A. Abdul Majid (Singapore/SG)

Background: Stroke survivors usually present cognitive impairments that usually requires long-term follow-up. This increases the manpower demands of healthcare. After returning to community, there are limited accessible resources to continue their cognitive training too. In addition, the current traditional single-sensory-input cognitive training is usually boring, which makes stroke survivors who are prone to mental fatigue feel even more difficult to be compliant with. This leads to slow recovery and low compliance rate of cognitive rehabilitation. Virtual Reality (VR) is emerging recently as a new technology in rehabilitation which was found effective in physical rehabilitation training for stroke patients.

Objective: The study aims to determine the feasibility of implementing a localised cognitive rehabilitation programme that was developed by the research team with hybrid methods (clinic and tele-rehab) for stroke patients with cognitive impairments.

Methods: This is an experimental study. We aim to recruit 12 acute ischemic stroke survivors whose age are between 21 to 77 with cognitive impairment (Montreal Cognitive Assessment(MoCA) score between 10 to 26) in the study. All patients will receive their VR treatment(30 minutes) and conventional training (15 minutes) each session either in clinic or via tele-rehab with Occupational Therapists(OT) for four weeks with four sessions per week. A few outcome measures for feasibility of VR, cognition and well-being will be performed pre- and post-treatment, which included A self-designed questionnaire including system usability scale (SUS), the intrinsic motivation inventory (IMI) and Virtual reality neuroscience questionnaire(VRISE), Repeatable Battery for the Assessment of neuropsychological Status Update (RBANS), Trail Test A&B and EQ-5D. all assessment results will be calculated in Statistical Package for the Social Sciences (SPSS).

Results: We are undergoing recruitment and we hope to share the results after the completion of the study by October 2023.

Conclusion: We would like to share the conclusion after the completion of the study by October 2023.

References

1. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Borden WB, Bravata DM, Dai S, Ford ES, Fox CS, Franco S. Heart disease and stroke statistics-2013 update. Circulation 2013; 127(1): e6-245.2.
2. Jose MC, Javier R-L, Manuel F, Maria TAW, Christos G, Alan A, Jose MBM, Doris ABL, Jose MS. (2018) Evolution of cognitive rehabilitation after stroke from traditional techniques to smart and personalized home-based information and communication technology systems: Literature review. Jmir Rehabilitation and Assistive Technologies. c4.3.
3. Greenleaf WJ, Tovar MA. (1994) Augmenting reality in rehabilitation medicine. Artificial Intellgence Medicine. 6:289 – 299. 4. Ng CS, Toh MPHS, Ng JY, Ko Y. (2015) Direct medical cost of stroke in Singapore. Page 11. DOI: 10.1111/ijs.12576

O019

The experience of tele neurorehabilitation in COVID-19 pandemic, inputs from physiatrists of an Indian neurorehabilitation desk

M. Sengupta (Kolkata/IN), S. Saha (Kolkata/IN)

Background: The Coronavirus disease pandemic heralded a global "new normal". India responded with a stringent complete lockdown. Simultaneously, the release of the Indian National Telemedicine Practice Guidelines led to a surge in Telemedicine. Physiatrists, are sparse and urban-centric in India. The authors share their experience of launching an indigenous tele neurorehabilitation service, a largely unexplored area in India. A retrospective chart review was done to determine the socio clinical characteristics of the population availing tele neurorehabilitation in a Physiatrist-led Neurorehabilitation Department.
Method: Before the launch, a strategic promotional campaign was designed. Consent forms were structured following the National guidelines with institutional modifications. A combination of the "real-time" and "store and transfer" models was used. Teleconsultation by Physiatrist was followed by telerehabilitation by therapists. Satisfaction scales were used for feedback.
Results: Between 8 Th April and 30 Th September 2020, there were a total of 561 teleconsultations of which 224 patients consulted the Physiatrist. Stroke (46 patients, 20.53**%**), low back pain (40 patients, 17.85**%**), and spinal cord injury ((27 patients, 12.05**%**) were the commonest diagnosis. A majority of 93 patients belonged to the age group of 40-60 years. A comparable number of patients within and outside the city availed of the service.
Conclusion: Tele neurorehabilitation with simply available resources is feasible and useful. The digital divide, security concerns, and restriction in the execution of treatment are its imitations. Technology and creativity can be combined to develop further viable telerehabilitation models.
Keywords: pandemic, tele neurorehabilitation, Physiatrists

O020

The effectiveness of home-based exergame training on cognition and balance in older adults: a comparative quasi-randomised study of two exergame interventions

A. Begde (Loughborough/GB), A. Alqurafi (Loughborough/GB), E. Hogervorst (Loughborough/GB), T. Wilcockson (Loughborough/GB)

Introduction: The effectiveness of exergame on fall risk in older adults is still unclear. While some studies reported that exergame could improve cognitive and physical functions related to fall risk, others show this improvement is not statistically significant. The discrepancy in these **Results** could be due to the different components and task specificity of exergame interventions.
Objectives: This open-label quasi-randomised study aimed to compare the efficacy of two different home-based dual-task exergame treatments involving different cognitive and physical demands on cognition, mobility, and balance in older people.
Patient & Methods: 50 older adults (65 – 85) were allocated to one of two 8-week home-based dual-task exergame inter-

ventions: Cognitive-Intensive Exergame Training (CIT) or Physical-Intensive Exergame Training (PIT). Timed Up and Go Test (TUG), Functional Reach Test (FRT), Visual Sensitivity Test (VST), Corsi-Block-Tapping Test (CBT), Stroop Task (ST) and Hopkins Verbal Learning Test (HVLT) were used to assess mobility and cognitive functions at baseline and after 8 weeks. In this study, in which the group*time interaction was measured by repeated measure ANOVA, both intention-to-treat (ITT) and per-protocol (PP) analyses were performed.
Results: ITT showed that improvement in VST and CBT was greater in the CIT group, representing a medium effect (P=0.04; η^2=0.09 and P=0.01; η^2=0.12, respectively). The improvement in HVLT and ST was significant in both groups (P<0.05), but this improvement was not different between the groups (P>0.05). We also found that balance improved more in the PIT group with a medium effect size (P=0.04; η^2=0.09). Although mobility improved significantly in both groups (P<0.01), there was no significant difference between groups (P=0.08). These **Results** were largely supported by the PP analysis.
Conclusion: Dual-task exergame training can improve mobility and cognitive function in older adults. However, the different cognitive and physical demands of these interventions may have varying impacts on fall risk. Therefore, a training program that includes both cognitive and physical domains with appropriate intensity is essential for the development of tailored exergame interventions to reduce fall risk in older adults.

O022

A sensitive immersive virtual reality method to assess far space in unilateral spatial neglect post stroke

M. Thomasson (Geneva/CH), D. Perez-Marcos (Lausanne/CH), S. Crottaz-Herbette (Lausanne/CH, Lausanne/CH), F. Brenet (Lausanne/CH), A. Saj (Geneva/CH, Montreal/CA, Longueuil/CA, Paris/FR), T. Bernati (Geneva/CH), A. Serino (Lausanne/CH), T. Tadi (Lausanne/CH), O. Blanke (Lausanne/CH,), R. Ronchi (Geneva/CH, Lausanne/CH)

Introduction: Unilateral spatial neglect (USN) syndrome is one of the most frequent consequences of unilateral hemispheric lesion after stroke, characterized by reduced awareness of stimuli in the contralesional (usually the left) side of space. The rate of USN occurrence is highly variable, ranging from 10**%** to 80**%**, reflecting the difference in sensitivity of the available assessment tools. These tools are mostly based on paper-and-pencil tests and a few computerized ones, focusing on the evaluation of the near, peripersonal, space. In particular, they fail in detecting important signs of neglect manifested in daily living activities in chronic stages.
Objectives: We investigated the sensitivity of an immersive virtual reality (VR)-based tool to assess the spatial exploration of the external, far, space after brain damage. We hypothesized that USN is currently underestimated given the limitations of current paper-and-pencil tests (restricted to the peripersonal space, and abstract and non-ecological materials).
Methods: We designed a 3D VR-based task to explore the extrapersonal space, stimulating a wide field of view (180°). The task, including four levels of difficulty, consisted of a virtual ecological environment with naturalistic stimuli, including static and moving targets, and distractors. Com-
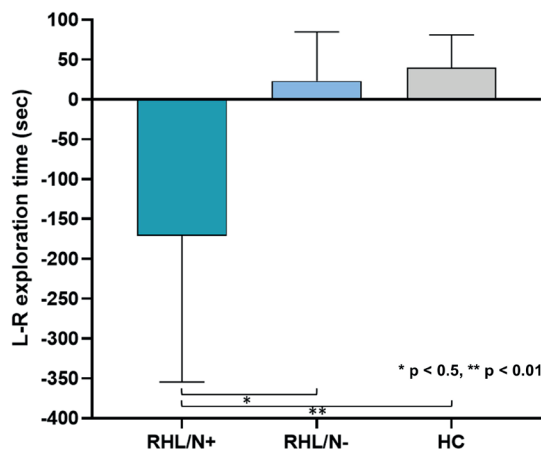
O022 Fig. 1

pared with paper-and-pencil assessments, our tool records additional parameters (e.g., exploration times). We administered the task to two groups of chronic patients with unilateral right (N=29) or left (N=10) brain hemisphere lesions, and a group of healthy age-matched control participants (N=40). Cut-off values for diagnostic criteria of defective spatial scores were established and statistical analyses conducted to assess the convergent validity and sensitivity of the new tool.

Results: The scores in the left-right exploration time revealed significant differences between groups (Fig. 1). Patients with right lesions and detected USN on paper-and-pencil tasks (RHL/N+, N=12) reported larger exploration asymmetries in VR as compared with patients without neglect (RHL/N-, N=17) and control participants (HC, N=40). This translated into an additional 30**%** of patients showing a pathological performance in the VR-based task, which were not detected with neglect signs using standard assessments. This defective exploration of the far space correlated with lesions in the right middle-postsersior insula, the Rolandic operculum, the middle and superior temporal lobe.

Conclusion: Our VR-based task is sensitive to detect spatial deficits in the far space after right and left brain stroke. It can detect even mild symptoms, improving the diagnostic process and, consequently, rehabilitation strategies. Next steps include further evaluation of the tool, including various degrees of USN severity and time since stroke.

O023

Functional reorganisation of attentional networks in childhood after virtual reality

N. Farron (Lausanne/CH), M. Moon (Lausanne/CH), E. Fornari (Lausanne/CH), A. Serino (Lausanne/CH), S. Clarke (Lausanne/CH), C. Newman (Lausanne/CH), S. Crottaz-Herbette (Lausanne/CH, Lausanne/CH)

Background: Childhood is a period of considerable changes at the level of the anatomy and connectivity of the brain, and of the cognitive processing, including attention. The attentional system has been divided in three neural networks underlying the processing of alertness, of orienting corresponding to the ability to detect spatial targets, and of the executive control of attention. Alertness is developed during the first months of life, while orienting develops between 6-9 months and the executive control of attention reaches full maturity in the second decade of life.

Objectives: The aim of this study is to investigate the changes following a visuomotor adaptation task in VR at a behavioural level and at the level of the regions underlying attention process, in normal children.

Methods: 15 neurotypical children, aged between 7 and 14 years, followed two sessions including (1) age-appropriate subtests of the Wechsler Nonverbal Intelligence Scale (WNIS), and (2) a rightward virtual reality-based visuomotor adaptation task in VR preceded (pre session) and followed (post session) by fMRI acquisitions with an attentional task and open-loop pointing tests to left and right visual dots. Open-loop pointing test was repeated after the second fMRI. fMRI allowed to compare the regions underlying the three attentional networks, before and after the visuomotor adaptation.

Results: In the WNIS, subjects reached percentiles between 50–90. The open-loop pointing test (Figure 1) showed large pointing differences between pre and post adaptation measures, confirming that participants adapted adequately to the rotation in VR. Activations in each network before the adaptation were similar to those observed in previous studies. Further analyses comparing activation after to before adaptation showed the most extensive modulations in the spatial orienting network, which make sense considering the visuospatial nature of the adaptation. Similar modulations were observed bilaterally in the precuneus, middle and superior frontal gyri and in the right angular gyrus for the alertness and orienting networks. Finally, the left and right postsersior regions of the cerebellum were the only common areas modulated in all three networks. These areas have a high level of cortico-cerebellar connectivity, that is crucial for visuomotor adaptation.
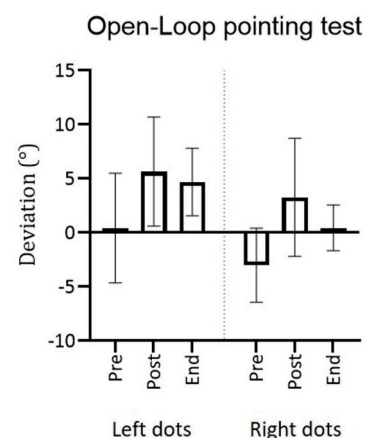
O023 Fig. 1. Mean and standard deviation of the pointing (i.e. aftereffects) measured in degree (°) for left and right visual dots, in the open-loop test in real life done before (Pre) and after (Post) the VR visuomotor adaptation task. The test was repeated about 40 minutes after the post session (End timepoint, after the second MRI session). A positive value corresponds to a deviation to the left of the dots, and vice-versa for a negative value.

Conclusions: Our study showed that (1) neurotypical children can adapt to a visuomotor rotation in virtual reality, (2) this adaptation leads to large modulations in the orienting

network, and (3) the functional modulations induced by the adaptation involve fronto-parietal regions similar to those observed in our studies on adults. This study is a first step to understand the functional reorganisation of attention networks during development.

O024

Power of humanoids: a new level in pediatric neurorehabilitation

A. Kolk (Tartu/EE), M. Saard (Tartu/EE), A. Roštšinskaja (Tartu/EE), C. Kööp (Tartu/EE), K. Kits (Tartu/EE), T. L. Loit (Tartu/EE), L. Uutsalu), J. Juhkami (Tartu/EE)

Introduction: Rapid progress in this technology area offers numerous possibilities for innovations and implementations of robots in education, medicine, rehabilitation and psychotherapy. Children perceive robots as characters with feelings, who they can be friends with, who deserve fair treatment and cannot be insulted.
Objectives: Our aim was to investigate which factors might be relevant for designing tools for social deficit rehabilitation using robot Pepper.
Patients & methods: The study was performed in the Children's Clinic of Tartu University Hospital. Children aged 4–16 yrs. participated: 47 with different neurological diagnoses and 43 typically-developed children during their hospital visit. To evolve communication skills and prosocial behavior in children, an Estonian-based interface for humanoid Pepper was developed. Neural speech synthesis technology Neurokone (text-to-speech solutions) with synthetic children's voices was used to deliver a talk-based treatment program with an embodied robot. Behavioral and communicative applications were programmed by authors. Interaction was examined in two ways: therapists' observations and a survey based on four sociocultural concepts (15 questions). Children also evaluated emotional states on the VAS scale.

O024 Fig. 1

Results: The study was designed to gather information on the characteristic features of CRI via dialogue with humanoid. Observation showed that all 90 children quickly engaged with Pepper (mean contact time 2.3 sec) implementing prosocial behavior with their mood immediately rising. On VAS, children evaluated their own and Pepper´s mood as happy (median score 4 out of 5). Children used verbal and non-verbal communication skills: holding eye-contact and expressing positive emotions. Survey revealed children's perceptions of Pepper: likability 93**%**, intelligence 90**%**, safety 70**%**, and anthropomorphism 66**%**. Children's sustained attention in interacting with the robot showed that
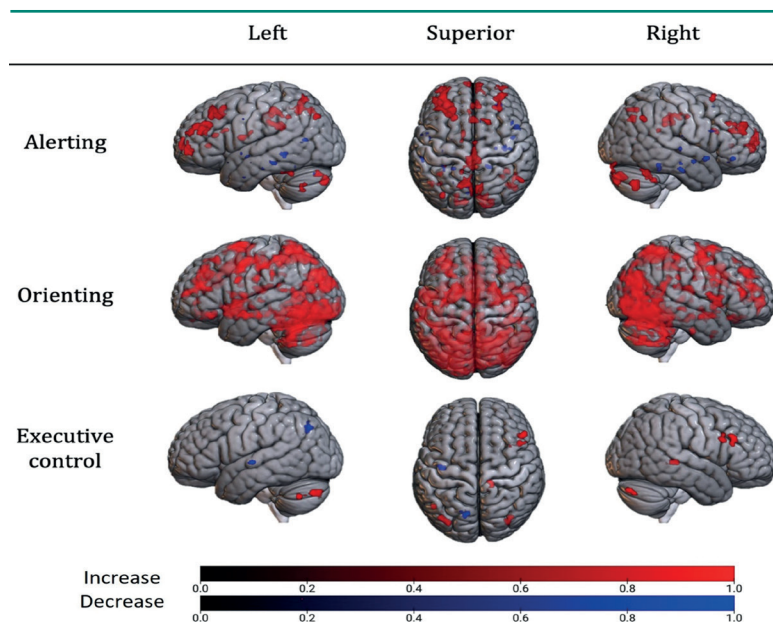
O023 Fig. 2. Surface renderings of the significant differences of activation before versus after the VR visuomotor adaptation task in virtual realitxy, for each attentional network. In red: activation Post > Pre; in blue: Pre > Post. Thresholds: p < 0.01, k adapted to the expected number of voxels per cluster provided by SPM12: alerting network (k=24), orienting network (k=19) and executive control network (k=23).

Pepper was socially acceptable and facilitated children's social communication.
Conclusion: We found that the anthropomorphic design of Pepper enhances acceptance, interaction and communication with children of all ages. Children's messages about CRI were positive in 100**%** of children. Pepper quickly attracted children's attention and increased willingness to attend therapy. They found Pepper to be friendly, cheerful, smart and safe – adding benefits to the rehabilitation process and reducing hospital fear, helping to promote well-being in hospitalized children.

O025

Remote cognitive testing in paediatric traumatic brain injury: evaluation of a digital cognitive tool in relation to gold-standard neuropsychology

C. Demarchi (London/GB), N. J. Bourke (London/G), M. Del Giovane (London/GB), W. R. Trender (London/GB), A. Hampshire (London/GB), D. J. Sharp (London/GB)

Paediatric traumatic brain injury (pTBI) is associated with persistent cognitive, behavioural and psychiatric problems. Its long-term effects are difficult to predict as the interactions between TBI and typical childhood brain and cognitive development are complex and heterogenous. Clinical neuropsychological assessments are recommended as the gold-standard measure of impairment following pTBI. Health services are facing an unprecedented level of demand, and children often do not have access to any assessment of cognition post-TBI. There is also a risk that single time-point assessments fail to identify effects of TBI that manifest as the child ages and brain injury continues to intersect with

typical development. Unidentified cognitive difficulties can lead to difficulties in school and a widening gap for children post-TBI, compared with healthy peers. Accessible and repeatable cognitive screening tools are needed to promptly identify TBI-related cognitive impairments and ensure early, targeted neurorehabilitation.

Building on work in adults, including with TBI (Del Giovane et al., 2023), this study sought to develop and validate a brief computerised screening battery to identify cognitive impairments in pTBI. We assessed pTBI patients (n=19) and healthy controls (n=21) to identify an optimal set of computerised tasks that correlated with gold-standard neuropsychology. Then, we explored their sensitivity to TBI-related cognitive deficits when generating performance scores while modelling a large sociodemographic age-matched normative dataset (mean n=46,202).

Across the entire sample, strong correlations were found between remote gold-standard neuropsychology and automated digital neuropsychology. For example, WASI2 vocabulary and digital word definitions (R = 0.61, p<0.001) and paper/digital Trail making switching (R=0.68, p < 0.001). Young people who have sustained a TBI have lower performance on a range of gold-standard neuropsychological measures and digital tests. Modelling the large normative dataset revealed a number of tasks that were uniquely sensitive to cognitive deficits post-TBI, including words immediate recall (p<0.05) and 2D manipulations (p<0.05). An optimal set of 11 computerised tasks, taking an average of 26-minutes to administer is proposed. The battery assesses the range of cognitive domains most at risk following pTBI,

including processing speed, executive functions, working memory, fluid reasoning and memory.

There is a need for new systems to support current health service delivery with low-cost technologies able to screen patients at multiple timepoints. In person assessments benefit from building rapport, controlled conditions and may involve longer comprehensive batteries. However, at present there is no gold-standard pathway for identifying cognitive difficulties and triaging young people post-TBI. This digital screener is a novel additional tool to assist in assessment and clinical decision making following pTBI.

0026
Brain reorganization in neglect patients after virtual reality-based rehabilitation

N. Farron (Lausanne/CH), H. Perrin (Lausanne/CH), C. A. Pestiaux (Lausanne/CH), D. Perez-Marcos (Lausanne/CH), S. Clarke (Lausanne/CH), A. Serino (Lausanne/CH), S. Crottaz-Herbette (Lausanne/CH)

Background: Virtual reality (VR) offers new possibilities to intensify neurorehabilitation of attentional deficits, including neglect, with multimodal and motivating tasks. Recent evidence shows that VR-based interventions are well tolerated, but there is still a lack of evidence whether and how VR-based training protocols can reduce hemineglect symptoms. Moreover, recovery depends on cortical plasticity and brain reorganization, both of which have yet to be better determined following VR-based training.

Objectives: This study investigated the changes in spatial attention, both at behavioural and brain network levels, especially in the ventral (VAN) and dorsal attention networks (DAN), after a VR-based cognitive rehabilitation program.

Methods: Five stroke patients with left neglect and hospitalized in a neurorehabilitation unit (Lausanne University Hospital, Switzerland) were recruited (mean age: 58.6 years; 3 patients with bilateral and 2 with right hemispheric stroke). The intensive VR-based rehabilitation program (MindFocus, MindMaze SA) involved, in addition to the standard of care, 20 personalized sessions of five different gamified activities targeting lateralized and non-lateralized attentional deficits via VR versions of, respectively, prism adaptation and visual scanning exercises, and alertness, selective attention, inhibition and divided attention exercises. Before and after the training, attention performances (neglect subtest of the test of attentional performance, TAP) and brain-related activation (3-tesla fMRI acquisitions during visuospatial detection task with left, centred, and right targets) were measured.

Results: The neglect test **(Fig. 1)** showed, in most patients, a decrease of reaction time between pre and post training assessments, corresponding to a behavioural improvement. fMRI data showed increased activation specifically after the training in the precuneus and middle frontal gyrus, as well as regions of the VAN (supramarginal gyrus) and DAN (superior parietal lobule). Activation in these areas increased significantly in the right hemisphere for left visual targets, and in both hemispheres for right visual targets. Adding the spatial attention performance (neglect test) as a covariate revealed that behavioural improvement was associated with: a) for left targets, a decrease of activation in the left (inferior parietal lobule) and right (angular and supramarginal gyri) VAN, in the left DAN (superior frontal gyrus) and

Behavioural performances at the neglect tests of the TAP battery
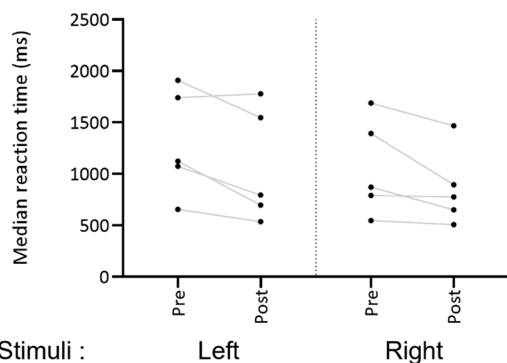
0026 Fig. 1. Median reaction times for the 5 patients, before (Pre) and after (Post) the rehabilitation program, for left and right stimuli of the neglect test (TAP battery).

Surface rendering of the differences of activation
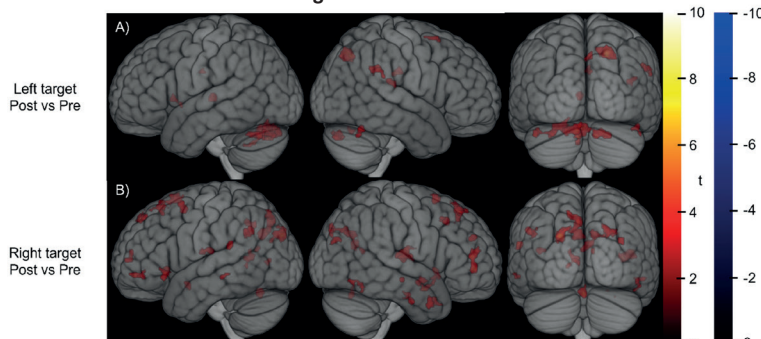
0026. Fig. 2. Surface rendering of the differences of brain activation between Baseline (Pre) and after (Post) the rehabilitation program, for left and right stimuli of the neglect test (TAP battery).

an increase of activation in the left DAN (superior parietal lobule); and b) for right targets, an increase of activation in the right VAN (inferior parietal lobule, supramarginal and inferior frontal gyri) and bilaterally in the DAN (superior parietal lobules). VR-based training appears to reduce symptoms of neglect and leads to modulations in the dorsal and ventral attention brain networks, in the right hemisphere for left visual stimuli and in both hemispheres for right visual stimuli.

O027

The application of explainable artificial intelligence (XAI) in studying cognition: a scoping review

S. Mahmood (Singapore/SG), C. Teo Kok Ann (Singapore/SG)

Background: The rapid advancement in artificial intelligence (AI) has reinvigorated scholarly discussion on its trustworthiness and by extension, the decades-long concept of explainability in AI or XAI, for short. In fact, the new wave of experimental research in the field of neuroscience has highlighted the relevance of XAI in studying cognition.
Objectives: This scoping review aimed to map out the different XAI methods used in studying the underlying mechanisms and features of cognitive function and dysfunction. The evidence collated was then assessed qualitatively, thereby allowing for the formulation of a viable framework in approaching XAI in the context of cognitive neuroscience.
Method: This review followed the Joanna Briggs Institute (JBI) and the PRISMA-ScR (Preferred Reporting Items for Systematic Reviews and Meta-Analyses extension for Scoping Reviews) reporting guidelines. For the systematic search, peer-reviewed articles were searched on the following databases: MEDLINE (Ovid), Embase, Web of Science, Cochrane Central Register of Controlled Trials (CENTRAL), and the first 10 pages of Google Scholar. Data screening, extraction and thematic analysis were conducted in parallel by two reviewers.
Results: We found 12 eligible studies published in the last 10 years and were all experimental by design. Nine (n=9, 75%) studied normal cognitive functions, such as perceptual-motor, social cognition, language, executive function and memory while three (n=3, 25%) studied states of impaired cognition. The types of XAI used were primarily intrinsic XAI (n=7, 58.3%) as well as attribution-based (n=5, 41.7%) and example-based (n=1, 8.3%) post-hoc methods. Explainability of either a local (n=8, 66.7%) or global (n=4, 33.3%) scope was employed. Findings from the application of these XAI techniques were anatomical (n=10, 83.3%) and non-anatomical (n=2, 16.7%) in nature. The anatomical findings were further delineated into neuronal, intra-cortical or inter-cortical observations. These findings were predominantly correlational. While the XAI techniques were lauded for their predictive power, robustness, testability and plausibility, the reported limitations included oversimplification, presence of confounders and inconsistencies.
Conclusion: The application of XAI in studying cognition is still in its infancy. The reviewed studies not only highlighted the immense potential of their chosen XAI models but also laid out their current limitations. We noted the XAI's struggle with causality and oversimplifications as well as the research community's inertia towards ensuring reproducibility in their XAI methods. The findings of these studies effectively guided the formulation of our proposed XAI framework with the intention to aid the neuroscience community in their future XAI methodology. We hope that the growing interest in the application of XAI in neuroscience would allow for the uptake and iterative development of the proposed XAI framework.

O028

Biofeedback gait training in patients in the early recovery period of cerebral stroke by target parameters – stance and single support phase

D. Skvortsov (Moscow/RU), S. Kaurkin (Moscow/RU), G. Ivanova (Moscow/RU), M. Shurupova (Moscow/RU)

Background: To restore the function of walking in patients with stroke, training **Methods** with biofeedback are used. At present, it is technically possible to conduct training with biofeedback on target biomechanics walking parameters.
The study **Objective** was to investigate the possibility of targeted restoration of gait function through biofeedback based on the stance phase and single support phase parameters.
Method: The study involved 40 patients with hemiparesis in the early recovery period of stroke in each group and 20 healthy controls. One group was trained by biofeedback to harmonize the function of walking by respect of Stance Phase, the other – in Single Stance Phase. A total of 8-11 trainings were held for each patient. Before and after a course of training in each group, an assessment of the clinical condition and biomechanical parameters of walking was carried out.
Results: According to this study, clinical and instrumental examinations demonstrated different sensitivity. In terms of biomechanical parameters, the Single Stance Phase group turned out to be functionally in a much more severe condition, which was not evident from clinical examination. Thus, according to the clinical examination, both groups were homogeneous but differed significantly according to the instrumental one. At the same time, the primary selection of patients was carried out by physicians of rehabilitation units according to inclusion/exclusion criteria based on traditional clinical parameters. Therefore, functional differences were identified only at the end of the study when analyzing the data.
In hemiparetic stroke survivors in the early recovery period, targeted training of the gait function by the Stance Phase and Single Stance Phase parameters is possible. When using Stance Phase as a target parameter, indirect evidence was obtained that such training was effective. However, no significant changes in the trained parameter on the affected side were noted. The Stance Phase parameter on the unaffected side decreased. Thus, the relative load on the paretic side in any case increased. No obvious changes as a result of the training based on the Single Stance Phase parameter were noted, probably since this group was functionally in a much more severe condition. Nevertheless, both groups showed an improvement in the main gait parameters at the end of the training course while it was not possible to exclude the temporal

O028 Fig. 1

factor itself as well as the conventional therapy patients from both groups underwent.

According to this study, clinical and instrumental examinations demonstrated different sensitivity. However, in hemiparetic stroke survivors in the early recovery period, targeted training of the gait function by biofeedback parameters is possible.

O029

Functional recovery of subjects with severe acquired brain injury after Vitamin D supplementation: pilot controlled randomized study

A. M. Centra (San Giovanni Rotondo/IT), F. Di Rienzo (San Giovanni Rotondo/IT), M. Gravina (San Giovanni Rotondo/IT), M. Copetti (San Giovanni Rotondo/IT), A. Iarossi (San Giovanni Rotondo/IT), G. Maruzzi (San Giovanni Rotondo/IT), D. Intiso (San Giovanni Rotondo/IT)

Background: Low Vitamin D (VD) has been associated to poor clinical course in several neurological diseases and supplementation has been suggested to improve recovery. Severe acquired brain injury subjects (sABI) have low VD level and disabling conditions requiring rehabilitation.
Objective: to evaluate if VD supplementation improves the outcome.
Materials & methods: Prospective, randomized-controlled single-blind study on patients with sABI admitted to Neurorehabilitation of the IRCCS "Casa Sollievo della Sofferenza" hospital between September 2020 and December 2022. Patients aged > 18 years old were randomized into two groups: experimental group (vitDS) that received conventional rehabilitation therapy and vitamin D supplementation; control group (CG), treated only with conventional rehabilitation therapy. Supplementation was carried out with an initial dose of 50,000 IU of vitamin D and subsequently with a daily dose of 1,000 IU.
The functional assessment was performed using the following scales at admission (T0) and at discharge (T1): Disability Rating Scale (DRS); Glasgow Outcome Scales (GOS); Level of Cognitive Functioning (LCF). Serum vitamin D levels were measured at T0 and T1
Results: A total of 137 subjects were screened and 73 patients (42 M and 31 F; mean age 53.2 ± 15.7 years) included in the study. Of these, 36 patients (21 M; 15 F; mean age 57.5 ± 14.8) were randomized into the vitDS group and 37 (20 M; 17 F, mean age 48.2 ± 17.4) into the CG. At discharge 26 were still present in the experimental group and 27 in the control group. At entry, serum vitamin D levels were: 21.2 mg/dl for the vitDS group and 22.18 mg/dl for the control group (p=0.66). At discharge, the serum VIT D level significantly increased in the vitDS group: 23.7 mg/dl vs 18.5 mg/dl (p=0.02), but the values remained deficit.
At discharge, both groups showed significant functional recovery. The mean score was 9.42 ± 5.83 for DRS; 3.78 ± 0.80 for GOS and $7.53 \pm .28$ for LCF, in vitDS group patients (p<0.001). Similarly, 9.84 ± 6.34 for the DRS; 3.81 ± 0.94 for GOS and 7.41 ± 1.32 for LCF, in GC patients (p<0.001). Functional outcome between the group treated with VIT D supplementation and the untreated group did not show significant differences (p=0.56 for DRS, p=0.68 for GOS and p=0.53 for LCF). However, patients with deficient serum VD level in vitDS showed more increase of functional scales scores. The mean hospital stay was 63 ± 36.8 days, with no significant differences between the two groups: 66.7 ± 36.5 in the vitDS group and 59.4 ± 37.3 (p=0.4), respectively.
Conclusion: Vitamin D supplementation in patients with sABI did not result in significantly greater functional recovery than in those not treated with vitamin D. The serum level of vitamin D in patients receiving supplementation increased, but the values remained at an insufficient level. Further studies need to be undertaken to evaluate whether vitamin D supplementation results in a benefit in these patients.

O030

The Back-To-Drive protocol: the development of an evidence-based scenarios database for driving rehabilitation of elders and ABI patients

C. Díaz Piedra (Granada/ES), F. Angioi (Granada/ES), R. Fernandez-Mendez (Cambridge/GB), G. Olivares (Granada/ES), M. J. Fernandez-Serrano (Granada/ES), P. Ariza-Vega (Granada/ES), S. Romero (Granada/ES), J. Sodnik (Ljubljana/SI), L. L. Di Stasi (Granada/ES)

Introduction: Driving simulators can be a powerful tool for the assessment and rehabilitation of cognitive skills. Clinical-oriented applications are now possible, as simulators have become more cost-effective, realistic, and easy-to-use by professionals working in rehabilitation centers. Yet, there are few examples of a standardized process for scenarios development, based on evidence-based rehabilitation processes and fitness-to-drive screening procedures.
Objective: To develop a simulation-based training program, the Back-To-Drive protocol, designed for drivers with cognitive deficits associated with both aging and acquired brain injury (ABI).
Materials & Methods: A multidisciplinary group of experts followed an evidence-based, iterative process. To create a general framework, they characterized the technological (high fidelity and ease of use) and clinical aspects that may enhance driving rehabilitation using simulators. Concerning the clinical aspects, experts agreed that the specific driving conditions and situations should be chosen a priori, based on specialized literature. Also, the protocol should allow tailoring to a driver's needs and pace of improvement. After identifying some of the most frequent environmental, vehicle, and subjective conditions that may lead to an accident, the design teams brainstormed possible driving scenarios. Such teams were made up of, at least, one clinical neuropsychologist, one expert in road design and layout, one expert in driving simulation, and one expert in human factors. Driving scenarios were linked to well-established traffic-related issues in our population of interest. For example, if driving in scotopic vision conditions is an issue, potential scenarios should include the possibility of training driving under adverse weather or in nighttime. After the scenarios were drafted, the teams searched for scientific literature on the role of these factors in driving performance. The goal here was to provide enough, relevant information for the scenario framework development. For example, approaching a signalized intersection when a traffic signal changes from green to yellow is a well-documented situation (i.e. dilemma zone), where drivers often have difficulty deciding whether to stop or continue. The final step was composing the scenarios.
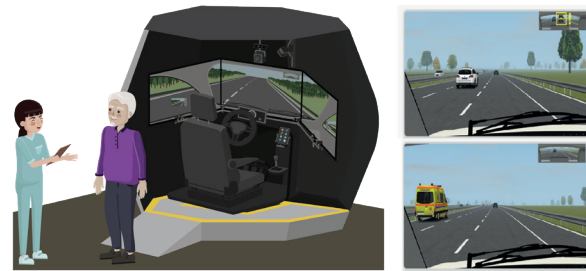
O030 Fig. 1

Results: The end-product of this process was nine basic ≈ 20-min long scenarios (urban, rural, and highway scenarios with different complexities) that can be combined with environmental factors (e.g. weather conditions), objective (e.g. traffic flow), and subjective characteristics (e.g. number of interactions) to build more scenarios that increase or diminish complexity.

Conclusion: Future steps include the assessment of the BTD protocol effectiveness in improving driving performance. Together with the use of dynamic, sensorized simulators (see Fig.), new opportunities for creating safer, standardized fitness-to-drive assessment and (re-)training are opening up.

O031

Implicit and explicit MI ability after spinal cord injury: a control-case series study

S. Mateo (Lyon/FR), A. Guillot (Lyon/FR), S. Henkous (Lyon/FR), A. Gellis (Montpellier/FR),), C. Collet (Lyon/FR), F. Di Rienzo (Lyon/FR)

Background: Cervical spinal cord injury (SCI) causes dramatic losses of sensorimotor functions and requires extensive rehabilitation to restore grasping. This can be further improved by adding motor imagery (MI). To date it is unclear whether MI ability is impaired or spared after SCI.

Aim: To investigate implicit and explicit MI ability after C6 or C7 SCI vs healthy control.

Material and Method: Individuals with C6 (n=7) or C7 SCI (n=7) at the chronic stage (5.75 ± 4.25 years) and age-gender-matched group of healthy individuals (n=14) were included in the study. All SCI were complete (AIS A). All participants were right-handed. All participants completed a battery of implicit MI tasks including hand laterality judgment (HLJT – Fiori et al., 2004), hand orientation judgment (HOJT – Johnson 2000), hand-object interaction judgment (OIJT – Daprati et al., 2010) and explicit MI evaluation of possible movement (elbow flexion forearm resting on a table), compensatory movement (tenodesis grasp) and impossible movement after SCI (pressing a keyboard fingers dissociated). Outcomes were responses time (RT) and accuracy (%) for implicit MI assessments, and movement duration for explicit MI assessments. We used R (R Core Team, 2021) and nlme to run a linear mixed effects analyses of RT/accuracy data collected during the MI evaluations, searching for interaction between group and independent variables related to the MI ability assessment paradigm.

Results: Only OIJT revealed different pattern of response for individuals with C6 SCI as compared to C7 SCI and controls; C6 SCI patients reported equally pronation or supination judgement (40 to 60%) i.e., at the level of chance for all stimuli orientations, whereas control and C7 SCI patients reported preferentially pronation judgments for 225°, 270°,

315° orientations, and supination for 45°, 90°, 135°, 180°. In addition, RTs were affected by the GROUP×VIEW interaction (F(2,1916)=5.23, p<0.01, ηp^2=0.02) in the HLJT; post hoc comparisons revealed that the RT difference between Back view and Palm view views in the control group (Back view: 1.46 s ± 0.81; Palm view: 1.74 ± 0.86) was superior to that observed in C6 SCI (Back view: 1.80 s ± 0.88; Palm view: 2.01 ± 0.90) and C7 SCI (Back view: 1.83 s ± 0.95; Palm view: 1.99 ± 1.02) groups. The other tests showed no statistically significant differences between groups.

Conclusion: The result obtained from an homogeneous sample of SCI participants support that MI ability mirrors the current state of the motor system. When motor control of the elbow was impaired due to the C6 lesion, only implicit pronation/supination judgments were strongly biased. Thus, MI can be recommended to complete rehabilitation with some adaptation for implicit MI of the elbow after C6 tetraplegia.

References:

Fiori et al., 2004, doi: 10.1111/jnp.12020; Johnson 2000, doi: 10.1097/00001756-200003200-00015; Daprati et al., 2010, doi: 10.1016/j.cortex.2009.08.002.

O032

Metacognitive impairment and its association with self-awareness in patients with traumatic brain injury

K. Yoshida (Sapporo/JP), D. Sawamura (Sapporo/JP), K. Ogawa (Sapporo/JP), T. Mototani (Sapporo/JP), K. Ikoma (Sapporo/JP), S. Sakai (Sapporo/JP)

Background: Metacognition is the ability to internally evaluate and control one's cognitive processes and is a crucial for adaptive behavior for everyday life. Metacognitive impairment often occurs in patients with traumatic brain injury (TBI) and is associated with clinical problems such as decreased involvement in medical care and rehabilitation, but its pathology and association with self-awareness remain unclear.

Objectives: We aimed to clarify the pathology of metacognitive disabilities in patients with TBI using a behavioral task, clinical assessment of self-awareness, and lesion-symptom mapping.

Methods: Metacognitive abilities of TBI patients and healthy controls were assessed using a modified perceptual decision-making task with prediction and confidence rating. For metacognitive ability, we computed the metacognitive sensitivity—ability to distinguish between one's correct and incorrect judgments, and metacognitive bias—tendency to report confidence ratings that are too high or too low relative to one's performance. Patients' self-awareness was assessed using the Patient Competency Rating Scale (PCRS) and the Frontal Systems Behavior Scale (FrSBe). The associations between estimated metacognitive abilities, self-awareness, and neuropsychological tests were examined. The correspondence between metacognitive disabilities and brain lesions was examined by region of interest-based lesion-symptom mapping using structural magnetic resonance images.

Results: Overall, 25 TBI patients and 95 healthy controls were included in the analyses. Compared to healthy controls, the prospective metacognitive ability of TBI patients was lower (p = .018, 95% CI [0.02, 0.24]), and their metacognitive evaluations were biased toward overestimating their abilities (prospective: p = .002, 95% CI [0.13 0.55]; retrospective: p < .001, 95% CI [0.16, 0.52]). Retrospective metacognitive ability
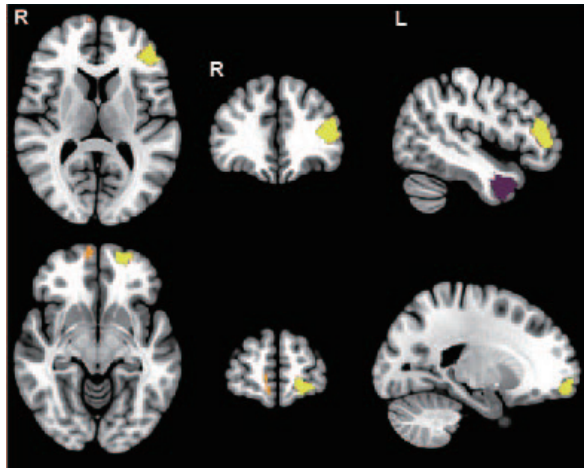
O032 Fig. 1

showed a negative correlation with self-awareness (PCRS: r=-0.46, p=0.041; FrSBe: r=-0.45, p=0.041) but not with neuropsychological tests. In the lesion-symptom mapping analysis, the left anterior prefrontal cortex and left dorsolateral prefrontal cortex were associated with lower retrospective metacognitive ability **(Fig. 1)**.

Conclusions: This study contributes to a better understanding of the pathology of metacognitive and self-awareness deficits in patients with TBI and may explain the cause of impaired realistic goal setting and adaptive behavior in these patients. Measuring metacognitive ability through behavioral tasks provides detailed information regarding metacognitive disabilities and avoids contamination by rater bias.

O033

Psychosocial predictors of compliance with neuro-urological follow-up in adult spina bifida and spinal cord injury patients: a prospective, comparative, multicenter parallel group study

J. Kerdraon (Ploemeur/FR), M. Jezequel (Ploemeur/FR, Rennes/FR), B. Perrouin Verbe (Ploemeur/FR), A. Blanchard Dauphin (Ploemeur/FR, Rennes/FR), I. Bonan (Ploemeur/ FR, Rennes/FR), P. Gallien (Ploemeur/FR, Rennes/FR), E. Castel Lakanal (Ploemeur/FR, Rennes/FR), G. Amarenco (Ploemeur/FR, Rennes/FR), J. M. Reymann (Ploemeur/FR, Rennes/FR), B. Peyronnet (Ploemeur/FR, Rennes/FR)

Background: Self-esteem in the adult spina bifida population remains poorly understood, and its value as a marker of self-management of sphincter disorders has never been evaluated. The primary **Objective** was to demonstrate a difference in the level of global self-esteem between a population of adult patients with spina bifida and a population of adult patients with an acquired traumatic spinal cord injury of the same neurological level. The secondary objective was to assess the predictive value of self-esteem as a marker of compliance to neuro-urological follow-up in these two groups.

This was a prospective, comparative, multicentre, parallel group study.

Patients were invited to participate in the study, which included an initial evaluation by questionnaires and a follow-up visit at six months. Inclusion criteria were age greater than 18 years, spina bifida aperta or acquired traumatic spinal cord injury more than two years old, lesion level less than T12 and greater than S1 (AIS A score). The micturition pattern, surgical history, current treatments and the level of urinary and anal continence were assessed using the ISCOS (International Spinal Cord Society) questionnaires.

The primary endpoint was the Rosenberg Scale (RSES). Secondary endpoints were the Moorong Self Efficacy Scale (MSES) and the Hamilton Anxiety and Depression (HAD) scale. Good compliance to neuro-urological follow-up was assessed by attendance at the 6-month follow-up appointment as well as educational correct execution of self-catheterisation and completion of the voiding diary provided at the first visit.

Results: The study included 59 Spina Bifida patients and 68 SCI patients with a mean age of 36 ± 11 and 45 ± 11 years respectively. Demographics differed significantly between the two populations for gender, body mass index and education level, access to adapted housing, driving, marital status and level of independence for mobility and transfers.

There was a significant reduction of the RSES score in the spina bifida population at the first visit (30 ± 6, 32 ± 5, p=0.0219) but not of the MSES (p=0.1821) , nor in the level of anxiety (8 ± 4) or depression (4 ± 4).

Incontinence and the use of pads were significantly more frequent and severe in the spina bifida population for both urinary and anal continence (p<0.0001) and irrespective of the treatment strategies.

No difference was observed in the level of compliance with neuro urological follow-up, either in attendance of the 6 month appointment (p=0.5630) or in completeness of the voiding diary and good execution of self-catheterisation (p=0.0531).

Conclusions: In accordance with previous studies on children and adolescents with spina bifida, a lower self-esteem in the adult population seems to be more a finality of the multiple deficiencies inherited from childhood and their severity than a marker of compliance with neuro urological follow-up.

O034

Clinical and electroencephalographic best predictors of recovery of consciousness in the subacute phase: preliminary data of a multicentric study

B. Hakiki (Florence/IT), P. Liuzzi (Florence/IT), A. M. Romoli (Florence/IT), F. Draghi (Florence/IT), D. Maccanti (Florence/IT), A. De Nisco (Florence/IT), R. Burali (Florence/ IT), M. Scarpino (Florence/IT), A. Grippo (Florence/IT), A. Mannini (Florence/IT), A. Magliacano (Sant'Angelo dei Lombardi/IT), A. Estraneo (Sant'Angelo dei Lombardi/IT), A. Comanducci (Milan/IT), J. Navarro (Milan/IT), C. Macchi (Florence/IT), F. Cecchi (Florence/IT)

Introduction: International guidelines recommend multimodal clinical (with the Coma Recovery Scale-Revised, CRS-R) and instrumental assessment (e.g., electroencephalography, EEG) for the diagnosis of consciousness in patients with prolonged consciousness disorder (pDoC).

Objectives: The present study aims to assess the predictive value of demographic, clinical (subscales of the CRS-R), anamnestic and neurophysiological (EEG) variables at admission on reaching an emergence from pDoC at discharge from the Intensive Rehabilitation Unit (IRU).

Patients & methods: This analysis was performed within the framework of the prospective multicentre study PRABI [1], which included patients with pDoC admitted to the 3 IRUs of the IRCCS Fondazione don Gnocchi (Sant'Angelo dei Lombardi, Santa Maria Nascente and Florence). On admission, the state of consciousness was assessed by repeated administration of CRS-R and the EEG was evaluated according to the terminology of the American Clinical Neurophysiology Society of Critical Care EEG [2]. Age, gender, time post-event (TPO) and etiology were included as independent variable in multivariate logistic regression. The dependent variable was the complete emergence from DoC at discharge from the IRU. Analyses including only clinical data, electrophysiological data and the combination of the two were then compared.

Results: From 10.06.2020 to 01.01.2023, 104 (Florence: 88) patients with pDoC were included: females: 46 (44.2%); age: median, [IQR] 67.5 [20] years; traumatic etiology: 35 (33.7%); TPO: 40 [21] days; unresponsive wakefulness state: 38 (36.5%), minimally conscious state minus 28 (26.9%) and plus 38 (36.5%). Multivariate analyses that included only demographic, clinical, and anamnestic variables and only EEG variables showed that the visual subscale of the CRS-R and cortical reactivity on EEG correlated significantly with emergence from pDoC (R^2=0.51, 0.29 respectively). Both remained independently significant when combined (EEG/CRS-R, R^2=0.64). When only the visual subscale of the CRS-R and cortical reactivity on EEG were included in the analysis, the R^2 was 0.53.

Conclusions: The study suggests that the visual subscale of the CRS-R and cortical reactivity on EEG at admission are the best predictors of emergence from DoC at discharge from the IRU.

References:

1. Hirsch L. J. et al. DOI: 10.3[MA1] 389/358fneur.2022.711312
2. Hakiki, B. et al. DOI: 10.1097/WNP.0000000000000806

O036

Neuroskin: an AI-powered neuroprosthesis for gait rehabilitation after stroke

A. Metani (Lyon/FR), B. Moreau (Lyon/FR), R. Nollot (Lyon/FR), M. Descollonges (Lyon/FR), J. Di Marco (Lyon/FR), L. Popović-Maneski (Belgrade/RS)

Background: Stroke is the first cause of acquired neurological handicap in the world, and recovery of walking capacity is one of the main aims in stroke rehabilitation. Functional Electrical Stimulation (FES) has been widely used in rehabilitation of post-stroke patients since the 1960s. Since a long time ago, research showed that the best effect is achieved if the treatment is applied in the acute phase of recovery when multiple muscles are stimulated in synergy. However, the complexity of hardware, difficulty of positioning the electrodes, time-consuming and skill-demanding personalisation of stimulation parameters, limits the commercial offer to devices with one or two channels of stimulation (e.g. drop-foot stimulators).

Objectives: Demonstrate the capabilities of NeuroSkin© (Kurage, France), a neuroprosthesis that facilitates FES walking therapy by automating the stimulation parameters personalisation through the use of AI, and suppressing the need of manual electrodes positioning through the use of a garment.

Methods: NeuroSkin© combines a lower-extremity garment embedding FES dry electrodes for six muscle groups and 7

IMUs, sandals with GRF sensors and an AI-powered real-time Clinical Gait Analysis (CGA) system that controls a MotiMove electrical stimulator. The CGA determines a real-time gait percentage used to set the timings and trigger the electrical pulses, according to the patient's gait pattern class. The optimal stimulation pattern for each user is determined following an automatic personalisation procedure where the patient walks 10 without FES, while the CGA system modifies a general model of gait, based on deep learning over a database of healthy and stroke hemiplegic walking patterns. After one week of habituation to the system, 6 acute (< 3 months) post-stroke adult patients, mean age 56, 3 men and 3 women, able to walk with physical assistance, have undergone 12 walking sessions using NeuroSkin© while supervised by a physical therapist (4 weeks, 3 sessions per week). The following tests and scores have been performed and measured, before and after using the device for 5 weeks: 10 meters walk test (10mWT), 6 minutes walk test (6MWT), Functional Ambulation Category (FAC) score and Barthel index (BI).

O036 Fig. 1

Results: The subjects have shown significant improvement in their walking speed and autonomy, as showcased by each test performed: 10mWT (22% less steps, 44% less time, 66% more speed), 6MWT (80% more distance), FAC (127% score increase) and BI (28% index increase). These improvements will be confirmed in a multi-centric randomized study with a control group

O037

Early intervention on postpartum femoral neuropathy: a multidisciplinary case report and literature review

E. Moita Gonçalves (Vila Nova de Gaia/PT), C. Lanzaro (Viana do Castelo/PT), L. Cunha Silva (Viana do Castelo/PT), P. Correia (Viana do Castelo/PT), J. V. Gonçalves (Vila Nova de Gaia/PT), M. Azevedo (Viana do Castelo/PT), I. Carrapatoso (Viana do Castelo/PT), J. P. Silva (Viana do Castelo/PT), C. Carvalho (Viana do Castelo/PT), A. Cruz (Viana do Castelo/PT)

Background: Postpartum femoral neuropathy is a rare but potentially debilitating complication that occurs in less than 1% of postpartum women. This condition causes unilateral lower limb motor weakness and sensory loss, which can significantly affect the patient's daily activities. The total recovery time for this condition is six months to a year, and early intervention is necessary to prevent permanent disability. Therefore, a multidisciplinary approach is essential to ensure a timely and accurate diagnosis, proper management, and early rehabilitation.

Objectives: The aim of this case report is to illustrate the effectiveness of an early multimodal rehabilitation program within an interdisciplinary framework in improving neuromotor function and activities of daily living (ADL) in a patient with postpartum femoral neuropathy.

Methods: We present the case of a 37-year-old puerperal woman who developed postpartum femoral neuropathy following intrapartum epidural analgesia. The patient presented with unilateral lower limb motor weakness and sensory loss, with functional compromise on independent gait. A multidisciplinary team, consisting of an anesthesiologist, a physiatrist, a neurologist, and an obstetrician,

was established to manage the patient. The initial physiatry and neurology assessment confirmed the suspicion of femoral neuropathy, and MRI ruled out potential complications related to the anesthesia procedure. The patient was then enrolled in a supervised rehabilitation program, which included physical therapy, electrotherapy, and pain management. Three weeks later, electrodiagnostic studies confirmed the initial diagnosis of femoral neuropathy. After two months of intensive rehabilitation, the patient regained lower limb active range of motion, and there was no pain or paresthesia reported.

O038 Fig. 1

O038 Fig. 2

Results: The early initiation of a supervised rehabilitation program within an interdisciplinary framework led to significant improvement in neuromotor function and ADL independence in the patient with postpartum femoral neuropathy. The patient's progress was carefully monitored by the multidisciplinary team, and treatment was tailored to the patient's individual needs. After only two months of intensive rehabilitation, the patient showed significant improvement in lower limb motor function and sensory perception, with no pain or paresthesia reported.

Conclusion: This case report demonstrates that an early multimodal rehabilitation program within an interdisciplinary framework can lead to significant improvements in neuromotor function and ADL independence in patients with postpartum femoral neuropathy. This underscores the importance of a multidisciplinary approach in the management of this condition to ensure timely and accurate diagnosis, proper management, and early rehabilitation, thus reducing the risk of permanent disability.

References:
PMID: 30697565, 33867563, 30470269, 25625259, 12576251

O038

Development of an acute management of disorders of consciousness pathway for therapies

D. Brown (London/GB), *M. Balmir* (London/GB)

Increasing numbers of people survive brain injuries due to medical advances. This results in more patients in disorders of consciousness (DOC) who present with high and complex care needs, requiring early therapy management and discharge planning. A pathway was developed to improve quality of care and ensure an equitable needs-based service for this patient group.

A consensus and evidence-based acute therapy pathway for management of patients presenting in a DOC was developed and introduced to increase staff awareness, confidence and competency in managing this patient cohort and to support patient flow within hospital, facilitating timely and appropriate discharge to rehabilitation facilities.

PDSA improvement methodology was used to streamline management of patients in DOC using the new Pathway for an initial trial in Neurosciences at King's College Hospital Foundation trust (KCH), Denmark Hill. Therapist's self-rating pre and post initial training showed 13**%** to 50**%** improvement in competency and confidence ratings for all therapy disciplines. An evaluation of service delivered pre and post use of the pathway showed a 56**%** reduction in length of stay from 12.5 to 7.1 weeks, significant increase in number of therapy sessions per week, 60**%** reduction in average time to referral for rehab from 7 weeks to 4.2 weeks and a 64**%** reduction in average time to PEG placement from 7 week to 4.5 weeks.

Use of an Acute Management of DOC Pathway for therapies has provided needed support at King's College Hospital foundation Trust to deliver a high quality, evidence-based and equitable needs-based acute therapy service for this patient group.
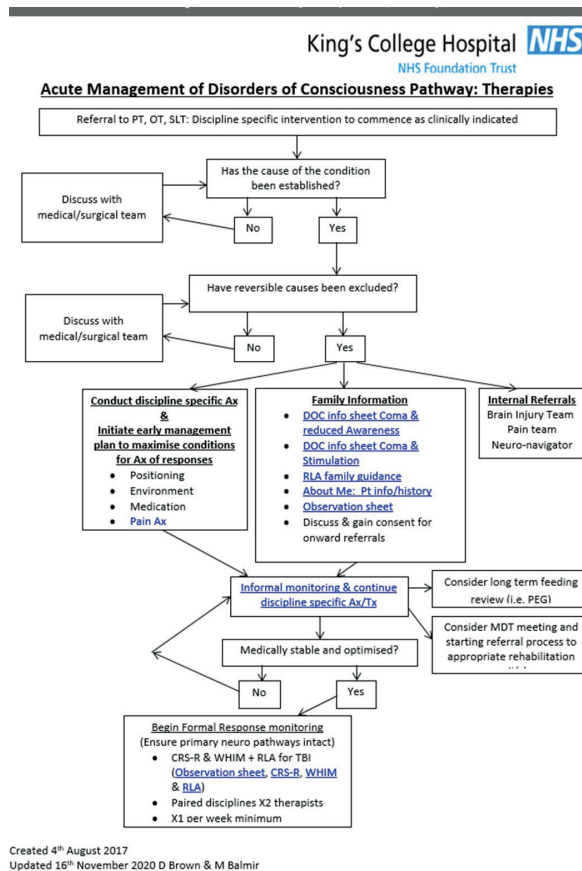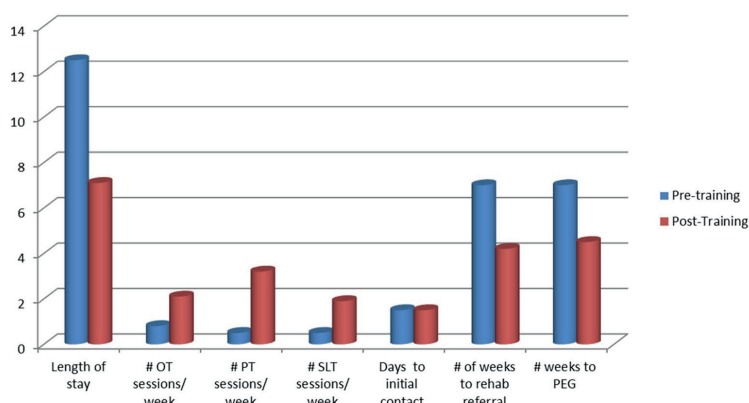
O039

Does the tibial nerve block improve knee recurvatum in spastic hemiplegic adults? A kinematic study

B. Eklu (Lyon/FR), J. Luauté (Lyon/FR)

Objective: To evaluate changes in knee recurvatum during walking after suppression of postersior leg compartment spasticity.
Methods: Hemiplegic patients with recurvatum who performed a quantified gait analysis before and after peripheral nerve block at the tibial level were included. The observation of the kinematics of walking at the knee level made it possible to conclude whether or not the intervention was effective. A measurement was performed to quantify the Ankle dorsal flexion was measured pre and post block, as well as maximum knee extension pre and post block. The correlation between these two movements was calculated by the Pearson coefficient.
Results: Of the 10 patients selected, half had a disappearance of the recurvatum. The responder and non-responder patients had several factors etiological factors for recurvatum. The correlation between increased ankle dorsiflexion and decrease in maximum knee extension was 0.76 (CI (0.26-0.96) p=0.01) demonstrating a strong and significant correlation.
Conclusion: In half of the cases, spasticity of the postersior leg compartment was the main etiology of etiology of knee recurvatum. Its removal leads to the disappearance of the recurvatum via increase in ankle dorsal flexion. In the other half of the cases, other factors are associated.

O040

rTMS using an accerelated stimulation program over the cerebellum improves motor function in Parkinson's disease

A. Lupa (Bonn/DE), M. Grobe-Einsler (Bonn/DE), O. Kaut (Bad Wimpfen/DE)

Introduction: The treatment of Parkinson's disease (PD) is mainly based on physiotherapy and pharmacological therapy, but pharmacological treatment is limited by the burden of adverse side effects. Thus the expansion of disease management to new effective therapeutic strategies with less adverse events is needed. Repetitive transcranial magentic stimulation (rTMS) is a nonpharmacological and noninvasive brain stimulation technique that has been proven to be effective in neurological disorders and PD. Interestingly the combination of rTMS and treadmill training improves gait function in PD greater than treadmill training alone.
Objective: Thus the aim of our study was to evaluate the combination of rTMS and treatment consistent of physiotherapy, occupational therapy and language therapy, the so called Parkinson's Disease Multimodal Complex Treatment (PD-MCT) to improve motor function.
Methods: 36 PD patients were randomly allocated either verum (n=19) or sham (n=16). The probands were assessed at baseline (V0) und after five days of treatment after the last rTMS session (V1). The primary clinical outcome was the UPDRSIII score, 8-meter walk test (8MW) and posturography was secondary clinical outcomes.
Results: rTMS improved the UDPRS III sum score comparing baseline and V1 in the verum group (p = 0.005), while no changes were found in the sham group (p = 0.21). The UPDRSIII sum score in the verum group changed by -7.7 points, and by 2.1 points in the sham group. The 8MW and the posturography remained unchanged in both groups after intervention.
Conclusion: rTMS may serve as an add-on therapy for improving motor symptoms of PD, but seems to be ineffective to treat postural instability.

O041

Improving Mobility Via Exoskeletons (IMOVE) – Implementing wearable robotic exoskeleton use across the continuum of rehabilitation care, from hospital to community

E. Chew (Singapore/SG), N. S. Kamsani (Singapore/SG), T. Y. Yap (Singapore/SG), A. Lau (Singapore/SG), J. Tan (Singapore/SG), Y. C. Lui (Singapore/SG), W. Qiu (Singapore/SG), N. Tang (Singapore/SG)

Background: Stroke is a leading cause of impaired mobility. Robotic exoskeleton training (RET) has been shown to be more effective than conventional physiotherapy (CP) to restore independent walking and improve walking speed post-stroke. We implemented RET across the continuum of rehabilitation care (hospital to community) to study the effectiveness and manpower utilization in different settings.
Method: The programme recruited patients undergoing neurorehabilitation in 8 sites in Singapore, from hospital to the community. Patients with Functional Ambulatory Category (FAC) 0-3, deemed to benefit from RET were recruited. This was a case-controlled study comparing outcomes after 12 sessions of mobility training using the EksoGT wearable robotic exoskeleton vs 12 sessions of CP. Outcomes measured included FAC, Clinical Outcomes Variable Scale (COVS), Functional Independence Measure (FIM), walking speed, number of person assistance required for manual-assisted walking, number of steps taken and distance walked at therapy
Results: Of 486 patients recruited, 336 completed 12 sessions with outcome measures available for analysis (369 RET, 69 CP). We analysed stroke inpatients. For those FAC ≤2 at the time of enrolment, FIM improved 16.6 in RET, 15.5 in CP (p=0.2), COVS improved 16.2 in RET and 16.4 in CP (p=0.99). For those FAC 1 at the time of enrolment, FIM improvement in the RET was 19.88, CP was 8.67 (p=0.013); COVS improved by 17.3 for RET and 11.82 for CP (p=0.032). Mean distance covered per RET session was 146.16m and 46.55m for CP (p<0.001). Mean number of steps was 500 for RET and 213.51 for CP (p=0.002). The number of therapists required to assist in conventional training for RET patients was 2.1 vs 1.7 for CP for those FAC 0 at baseline; 1.4 for RET and 1.2 for CP for those FAC 1. EksoGT training requires 1 skilled therapist ± another untrained assistant, representing potential manpower savings for those who are dependent with mobility.
Conclusion: For stroke patients undergoing inpatient rehabilitation requiring moderate assistance, significant mobility benefits were seen for RET vs CP after 12 sessions. Between-group difference was not significant for those more dependent, possibly because of the short duration of intervention. Greater intensity of training was possible with RET. Further studies are required to assess cost-effectiveness.

O042

Comparison of evoked sensations in patients with Spinal Cord Injury undergoing two types of robotic gait rehabilitation (Lokomat vs Ekso GT): the patient's point of view for helping clinical choice

M. Olivieri (Lucca/IT), E. Bertolucci (Pisa/IT), T. Tombini (Pisa/IT), G. Stampacchia (Pisa/IT)

Introduction: Motorized exoskeletons play a key role in walking recovery following Spinal Cord Injury (SCI). Moreover, motorized exoskeletons can return the ability to move in daily life as wearable orthosis. A fundamental element of the use of exoskeletons in rehabilitation includes the type of sensation that the use of the devices elicit in the patients. Since there are several commercially available exoskeletons, greater attention should be given on the sensation experienced with the use of different types of devices. This kind of study can help the clinicians to correctly address patients with different SCI to the most appropriate exoskeleton.

O042 Table 1.	Patient's Characteristics	
Lesion Onset	**<1 year**	4
	1-5 years	17
	6-10 years	4
	>10 years	5
AIS	**A**	5
	B	5
	C	11
	D	9
Injury Severity	**C1-C4**	0
	C5-C8	7
	T1-S5	14
	AIS D	9
SCIM-II (0-100 points)*		66 [54-75]
WISCI-II (0-20 points)*		2 [0-13]
MAS dx (0-5 points)*		0 [0-1]
MAS sx (0-5 points)*		0 [0-1]
Pain (0-10 NRS)*		0 [0-4]
Spasticity (0-10 NRS)*		1 [0-5]

Legend: * values are expressed as median [IQR]. Abbreviations: SCIM (Spinal Cord Independence Measure - II); WISCI-II (Walking Index Spinal Cord Injury - II); MAS (Modified Ashworth Scale); NRS (Numeric Rating Scale).
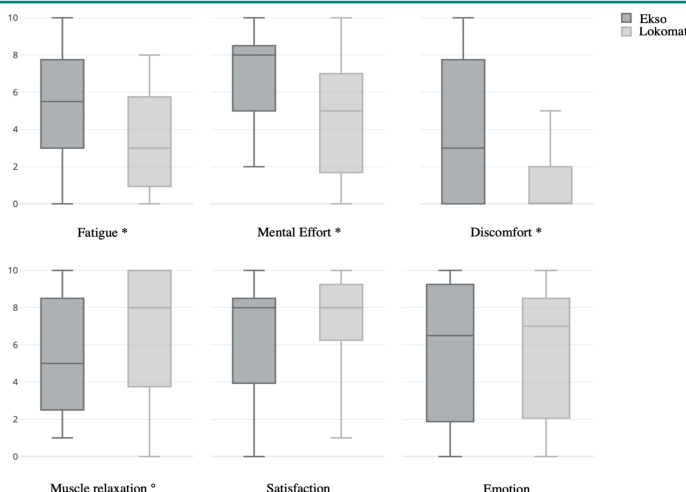
O042 Fig. 1. Exoskeletons' sensation questionnaire. Boxplot representation of median values for each questionnaire item. * siginificantr difference according to p value (Loko vs Ekso mean ± SD) (p<0.05) and mean difference (CI); °significant difference according only to p value (p<0.05)

Objective: The main objective of this study was to measure and compare the sensations elicit with a static robotic exoskeleton (Lokomat, Hocoma) and an overground exoskeleton Ekso GT (Ekso Bionics, USA) in subjects affected by SCI.

Patients and Methods: Thirty patients (45±18 years; 18 male vs 12 female) **(Table 1)** with different SCI levels were recruited by trained physicians to undergo robot-assisted gait training sessions: 3 sessions of both Lokomat and Ekso GT. All 30 patients enrolled in this study had never used any robotic device before. With Lokomat, the subjects were walking on a treadmill at constant velocity (1.5 km/h), supported by a Body-Weight Support (BWS) system (50–30**%** of body mass) and assisted by guidance force (85**%**). With Ekso, patients walked in a 10-m corridor assisted by a front-wheeled rolling walker and the supervision of a trained therapist. Positive and negative sensations were investigated using a questionnaire. The questionnaire was submitted at the end of the 3 sessions to compare the devices and to value the motivation to continue the training. The questionnaire reported the subjective experience (range: 1 – 10) of "fatigue" (F), "muscle relaxation" (R), "mental effort" (Ef), "discomfort" (D), "satisfaction" (S), and "emotion" (E).

Results: Patients reported higher sensation of fatigue, mental effort and discomfort with the Ekso sessions **(Fig.1)**. The sensation of muscle relaxation, satisfaction and emotion were similar for both equipment **(Fig. 1)**. No adverse events have been reported.

Discussion and Conclusion: The positive sensation are equally experienced with the two devices, as they both help the patient to experience walking again with all the psycho-physical benefits: muscle mobilization, tone normalization, activation of abdomen organs, but also the pleasant perception of the orthostatic position and motion of gait. On the other hand, Ekso GT has no BWS and a specific pitch activation system called "ProStep" which makes the human-robot interaction challenging, as reported by the patients with significantly higher sensation of fatigue, mental effort and discomfort. The patient reported outcome about different robotic devices could help physicians with the design of specific protocols in order to correctly address participants to the most appropriate treatment.

O043

Physical Activity Based on Daily Step-count in Inpatient Setting in Stroke and Traumatic Brain Injury Patients in Subacute Stage: A cross-sectional observational Study

B. Mischler (Bern/CH), C. Maguire (Bern/CH), R. Hilfiker (Bern/CH), M. Hund-Georgiadis (Basel/CH)

Background: Daily step-count is important post-insult in the subacute phase to influence neuroplasticity, functional recovery and as a predictive factor for activity level one-year post event.

Objective: Measure daily step-count in subacute patients following brain injury in an inpatient neurorehabilitation setting and compare these to evidence-based recommendations.

Methods: 30 participants measured of daily step-count over a seven-day period, throughout the day to assess when and how activity varied. Step-counts were analyzed in subgroups based on walking ability using the Functional Ambulation Categories (FAC). Correlations between steps-count

and FAC level, walking speed, light touch, joint position sense, cognition, and fear of falling were calculated.

Results: Median(IQR) daily steps for all patients was 2512 (568.5, 4070.5). Not independently walkers took 336 (5–705), value is below the recommendation. Participants walking with assistance took 700(31–3080), significantly below recommended value (p=0.002), independent walkers took 4093 (2327–5868) daily steps, significantly below recommended value (p≤0.001). Step-count showed moderate to high and statistically-significant correlations: positive for walking speed, joint position sense, negative for fear of falling, and number of medications.

Conclusions: Only 10% of all participants reached the recommended daily steps. Interdisciplinary team-work and strategies to increase daily activity between therapies may be crucial to achieve recommended step-levels in subacute inpatient settings.

O044

Gaze-contingent modification can help to reduce ipsilesional attention bias

A. Sprenger (Luebeck/DE), L. Kunkel genannt Bode (Luebeck/DE), C. Helmchen (Luebeck/DE), B. Machner (Luebeck/DE)

Current treatments of visuo-spatial hemi-neglect mostly use top-down guided behavioral therapies: "just look left". We reasoned whether bottom-up feature modification in visual exploration and visual search task might influence spatial attention.

In a first experiment we altered the visual saliency (and thereby attentional priority) of objects in a naturalistic scene along a left-right spatial gradient and investigated whether this can induce a bias in the exploratory eye movements of healthy humans (N=28). We developed a computerized mask, using "gaze-contingent" (GC) display technology that immediately and continuously reduced the saliency of objects on the left with respect to the head (body-centered) and the current position on the retina (eye-centered). In both experimental conditions, task-free viewing (FV) and goal-driven visual search (VS), this modification induced a mild but significant bias in visual exploration similar to hemispatial neglect.

In a second experiment we recorded gaze positions in 19 patients with left hemispatial neglect following right-hemisphere stroke and 22 healthy control subjects with the same paradigm. The patients' median gaze position (Center of Fixation) in the original pictures was markedly deviated to the right in both tasks (FV: 6.8° ± 0.8; VS: 5.5° ± 0.7), reflecting the neglect-typical ipsilesional attention bias. GC modification significantly reduced this bias in FV (GC-HIGH: d = −3.2 ± 0.4°; p < 0.001). Furthermore, in FV and VS, GC modification increased the likelihood to start visual exploration in the (neglected) left hemifield by about 20%. This alleviation of the ipsilesional fixation bias was not associated with an improvement in detecting left-side targets, in contrast, the GC mask even decreased and slowed the detection of right-side targets. Subjectively, patients found the intervention pleasant and most of the patients did not notice any modification.

GC technology can be used to positively influence visual exploration patterns in patients with hemispatial neglect. Despite an alleviation of the neglect-related ipsilesional
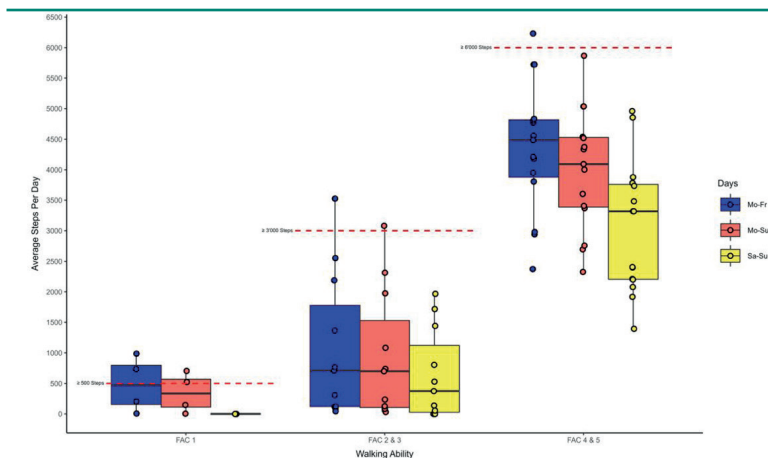
O043 Fig. 1

O043 Table. Number of steps per day were taken by setting and type of therapy (mo–fr)

Type of Therapy Median (IQR)	FAC 1	FAC 2	FAC 3	FAC 4	FAC 5
Individual Physiotherapy	99 (60.9;119.3)	43 (29.4;104.6)	433 (368.7;554.3)	198 (181.2;371.6)	480 (331.6;502.2)
Individual Occupational Therapy	0 (0.0;0.0)	10 (0.0;44.1)	351 (127.7;598.4)	181 (132.2;379.6)	235 (213.8;296.6)
Outside of Therapy	0 (0.0;0.0)	71 (0.0;219.3)	1392 (1176.5;1641.6)	3076 (2539.1;3874.2)	3258 (3133.2;3689.6)
Lokomat Robotic Gait	372 (69.4;772.3)	-	-	-	-
Treadmill	-	67 (54.0;80.0)	149 (148.6;148.6)	271 (161.6;380.7)	145 (144.8;144.8)
Group Sport Therapies	-	38 (26.6;48.0)	-	235 (118.4;551.0)	323 (107.9;718.1)
Gym Strength Training	-	-	161 (93.4;228.1)	233 (161.8;361.0)	636 (635.0;635.6)

Notes: Therapies that were not performed in this group were marked with "-"; IQR= interquartile range IQ1-IQ3; mo-fr= Monday till Friday

fixation bias, a concomitant functional benefit (improved detection of contralesional targets) was not achieved. Future studies may investigate individualized GC-based modifications as augmented reality applications during the activities of daily living.

O045

Efficacy of a multi-disciplinary and patient partner-faceted rehabilitation program on Genetic and Degenerative Ataxia

L. Pignon (Lyon/FR), M. C. Pouget (Lyon/FR), D. Nivesse (Lyon/FR), S. Jacquin-Courtois (Lyon/FR), G. Rode (Lyon/FR), S. Mateo (Lyon/FR)

Background: Genetic Degenerative Ataxias (GDA) encompasses a group of rare pathologies affecting the cerebellum. Patients with GDA have a progressive worsening in motor coordination and balance thus decreasing the Quality of Life (QoL), in particular its physical component. Since 2019, Henry Gabrielle Hospital has established a multi-disciplinary rehabilitation program with the cooperation of patient-partners. To date, only Physical Therapy has been reported as effective to decrease the symptoms severity in patients with GDA but effect of rehabilitation on walking or QoL remains inconclusive. We expect that a multi-disciplinary – targeting body structures, activity and participation – and

O046 Fig. 1

patient-partners rehabilitation program - setting aims closer to patient's expectations – could improve the condition of patients with GDA.

Objectives: To assess the efficacy of a multi-disciplinary and patient-partners rehabilitation program on the intensity of symptoms, balance, walking and QoL of patients with GDA.
Method: We extracted data of the medical records of patients with GDA that followed our rehabilitation program measuring the symptoms intensity using the Scale for Assesment and Rating of Ataxia (SARA), balance using the Mini-Balance Evaluation System Test (Mini-BESTest), walking by counting the number of daily steps performed at home using actimetry and QoL using the physical component of 36-Item Short Form Survey (pcSF-36). Data was available before (T1) and after (T2) rehabilitation for all outcomes, and at 1-month (T3) and 3-months follow-up (T4) only for actimetry and pcSF-36. To investigate whether changes in outcomes reached significance (p<0.05), paired t-tests were used for SARA and Mini-BESTest, and ANOVA with Tuckey HSD post-hoc for actimetry and SF-36. Data are reported as mean [95**%** CI].
Results: Data of 38 patients were extracted from 47 medical record from January 2019 to March 2023 (i.e., from onset to last inclusion in the program). Patients was 50 [44; 55] years old and the time since diagnosis was 12 [9; 16] years. SARA score was 12.6 [11.3; 13.9] at T1 and 9.7 [8.6; 10.8] at T2, it significantly decreased by 2.7 points [1.9; 3.5], Mini-BESTest score was 10.0 [7.7; 12.3] at T1 and 13.7 [11.5; 15.9] at T2, it significantly increased from 3.6 points [2.5; 4.8], all p<0.01. Conversely, ANOVA revealed no significant changes in daily number of steps (steps at T1: 5401 [3498; 7304], at T3: 5158 [3939; 6377], and at T4: 5882 [2848; 8916]) nor in the pcSF-36 (score at T1: 56**%** [38; 74], at T3: 67**%** [52; 82] and at T4: 63**%** [49; 77].
Conclusion: The **Results** suggest an immediate effect after a multi-disciplinary and patient-partners rehabilitation to decrease the intensity of symptoms and increase balance in GDA. Future studies should investigate the immediate change in walking capability and QOL after rehabilitation along with the lasting effect of the changes in symptom intensity and balance.

O046
Pilot study to observe the change in independence in everyday life through intensified wheelchair mobility training in wheelchair-dependent children

L. van der Stam (Berlin/DE), A. M. Kaindl (Berlin/DE)

Background: It is often observed that children have to learn how to use a wheelchair with difficulty and lack the necessary self-confidence to master obstacles in everyday life. Summer 2021, a wheelchair parcours with different surfaces and obstacles opened at the Charité University Hospital. In this present study, training will take place on this parcours. It is expected that the Results will show an improvement independent mobility. This effect is not only expected for the duration of the training period, but the learned skills and self-efficacy can also be transferred to everyday life afterwards.
Method: The study participants are randomly assigned to the case or control group. The case group will receive intensified, weekly wheelchair mobility training over 3 months, while the control group subjects will complete a standard five-day course. All study participants will be evaluated after completion of the training and 6 months afterwards, using the standardized physiotherapeutic test methods. The pilot study includes 16 participants.
Results: The results of this study show no significant changes in independency in both groups measured by PEDI-CAT questionnaire. Strength of the upper limb improved in the case group, but stabilized in the control group. Trunk control improved significantly directly after training in the case group, and 6 months later. In the control group, significant improvements were first found 6 months after completion of the training. Both groups achieved most of their goals according to the goal attainment scale, the sustainability effect was more marked for the Case group.
Discussion: For the social participation of wheelchair-dependent children, it is important to be able to use the wheelchair independently and to overcome everyday obstacles. The small cohort in the study show interesting results and effects of wheelchair mobility training. We would like to increase the knowledge about the influence of wheelchair mobility training on participation in everyday life.

O047
Efficacy of functional electrical stimulation after critical COVID-19: preliminary results

S. Mateo (Lyon/FR), A. Foncelle (Lyon/FR), V. Bergeron (Lyon/FR), J. C. Richard (Lyon/FR), L. Argaud (Lyon/FR), V. Piriou (Lyon/FR), G. Rode (Lyon/FR)

Background: The severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) caused the coronavirus disease 2019 (COVID-19) totaling >676 billions cases worldwide, 40 millions in France); 5**%** of cases developed a critical acute respiratory distress syndrome requiring mechanical ventilation in an intensive care unit (ICU) for a prolonged length of stay (LOS). Rehabilitation of patients with critical COVID-19 aiming to recover from the dramatical muscles and cardiorespiratory losses due to the prolonged period of inactivity showed promising **Results** in decreasing daily sedentary duration comparing cycling vs cycling with functional electrical stimulation (FEScycling), (Mateo et al., 2021).

Objectives: To investigate the efficacy of a 4-week daily training (i.e., 20 sessions) of FEScycling vs cycling on daily duration of sedentary or light/moderate activities (primary), muscle strength and tonus, pulmonary function, body composition and walking ability.

Method: Single-center randomized controlled trial (clinicaltrial.gov NCT04841746) assessor blinded with parallel assignment between an experimental (FEScycling + rehabilitation) and a control group (cycling + rehabilitation). Outcomes were actimeter, simplified manual muscle test, stiffness coefficient measured using myoton, forced expiratory volume measured by a portable spirometer, muscle mass measured by BiodyExpert, and gait speed during a 10m walking test. Each outcome was measured every week. Data were analysed using R (4.2.1) and constrained longitudinal data analysis (cLDA) i.e., mixed models with an interaction term between group and end vs beginning of training and age as fixed effects and participant as random effect.

Results: A total of 20 participants (planned 70) were randomized between cycling (n=8, 1 female, mean age 53±10y) and FEScycling (n=12, 1 female, mean age 61±10y). At baseline, there was no difference in body mass index (27.8±3.8 vs 28.7±5.1), LOS in ICU (26±18d vs 24±16d) or total distance covered during training (117±33km vs 129±24km) between cycling and FEScycling groups respectively. Comparison of changes between first and last week of training revealed no significant difference between groups for any outcomes including primary as shown by the daily duration sedentary (-66 min.d-1 95%CI[-212; 80] vs 8 min.d-1 [-110; 126]) or light/moderate activities (76 min.d-1 [-64; 215] vs 73 min.d-1 [27; 118]) for cycling and FEScycling respectively. However, all participants showed improvement of all outcomes between the first and last week of training and muscle strength, pulmonary function and walking speed reached significance (p<0.05).

Discussion: Preliminary **Results** showed no difference between cycling and FEScycling due to underpowered study. Larger sample sized study controlling spontaneous recovery effect are welcomed before recommending physical training to improve the condition of patients with critical COVID-19.

Reference:
Mateo et al., 2021. 10.1016/j.rehab.2021.101516.

O049

Implementation of SMN restoring therapies in symptomatic patients with spinal muscular atrophy: a description of new phenotypes in children and adults

S. Ribault (Lyon/FR), L. Le Goff (Lyon/FR), P. Rippert (Lyon/FR), C. De Montferrand (Lyon/FR), M. D. Morard (Lyon/FR), A. Barrière (Lyon/FR), E. Bernard (Lyon/FR), A. Pegat (Lyon/FR), C. Vuillerot (Lyon/FR)

Introduction: Spinal muscular atrophy is a hereditary motoneuron disease caused by a deficit in the SMN protein, leading to a progressive limb and axial motor deficiency. It is the most frequent genetic cause of death in childhood. SMN restoring therapies accessed the market in 2017 in France. Recent implementation of innovative molecules challenges the local organization of care. Long-term survival of patients with the most severe forms generates new clinical phenotypes of SMA requiring life-long medical care with a high level of expertise, with little evidence in the literature.

Objective: To describe the phenotypes of individuals with a spinal muscular atrophy during the implementation of SMN restoring therapy

Material and methods: a retrospective descriptive study was performed including patients diagnosed with SMA and followed up in Lyon neuromuscular disease center between 2012 and 2022.

Results: Over this period, 149 patients were seen at least once. While 26 patients died over the period (85% type 0 and 1), 84 patients were able to start a treatment (respectively 13/33/38 with SMA type 1/2/3). 4 received Zolgensma, 46 Risdiplam and 45 Nusinersen. Among the 11 type 1 treated children [1-8 years], 7 benefit from a nocturnal NIV, 9 patients acquired stable sitting position, 8 eat exclusively by the mouth and all have early progressive scoliosis. Among the 15 treated type 2 children, 3 can stand with support. 1 patient treated at the age of 18 months acquired walking at 3.5 years. 14 presented with scoliosis. Among the 26 type 1 and 2 children, 21 had scoliosis, and 12 underwent surgery (arthrodesis or growing rods). 16 type 1 and 2 children have at least 1 dislocated hip, 3 with associated pain. Among the whole population, 15 had at least 1 fracture, 13 patients had documented osteoporosis, and 8 underwent anti-osteoporotic treatment.

In the adult population, 12% presented with lombalgia, and 8% had a radicular pain (sciatalgia, cruralgia, or cervicobrachial nevralgia). 11 patients had urinary tract lithiasis.

During the sperm cryopreservation procedure performed in 7 men before treatment with Risdiplam azoospermia was found in 3 patients.

Discussion: Early introduction of treatment in symptomatic SMA patients modifies natural history of the disease with the appearance of new phenotypes justifying special attention from Physical and Rehabilitation team for the follow-up of treated patients. Especially, the impact of new therapeutics on neuro-orthopedic and extra-neurological features remains uncertain and is one of the challenges of the multidisciplinary teams following these patients, from childhood to adulthood.

O050

Child-Robot Interaction (CRI) patterns – diverse practical approach

M. Saard (Tartu/EE), A. Kolk (Tartu/EE), A. Roštšinskaja (Tartu/EE), C. Kööp (Tartu/EE), T. L. Loit (Tartu/EE), K. Kits (Tartu/EE), L. Uutsalu (Tartu/EE)

Introduction: Social robots (SR) are made to engage in interactions with humans; studies have shown that talking to a robot is sometimes easier than talking to a human (Robinson et al. 2021). Recent studies address robots as companions and peers. To reach communication and therapy goals in children with robots, a number of issues need to be investigated.

Objectives: The aim of the study was to investigate the patterns of child-robot interaction (CRI) in different children's groups.

Patients & methods: The study was conducted at the Children's Clinic University of Tartu during 18.01-13.03.2023. Research group consisted of 90 randomly selected children aged 4-16 yrs (median age 9 yrs). There were 45 boys and 45 girls. 47/90 had a neurological diagnosis (ND) and 43/90 were typically developed control group children (CG). 46 children interacted directly with robot Pepper and 44 via video. We used a child-like robot Pepper (height 120 cm, weight 28 kg) created by Softbank Group. Pepper is able to switch between multiple activities within single interactions. The interaction session lasted for 8-10 minutes. Inter-

O050 Fig. 1

action was examined by therapists' observations and by a survey conducted with children (15 questions).

Results: Boys' and girl's CRI showed several differences. Trend showed that girls reported the likability of Pepper higher than boys (p=0.052). Girls also perceived Pepper as having higher intelligence compared to boys (p<0.05). Girls made eye contact quicker with Pepper (p<0.05). Boys and girls reported similarly high anthropomorphistic qualities in Pepper. Children with ND used less non-verbal communication, like smiling, during CRI compared to CG (p<0.05). Trends showed that children with ND perceived the robot to be less harmful (p=0.076) and assessed their own mood higher (p=0.08) compared to CG. Robot's likability was higher for children who interacted directly with the robot compared to children watching the video (p<0.05). Robot seemed more harmful from the video compared to live dialogue (p<0.01). Robot's intelligence was assessed similarly high in both interaction methods. Children interacting directly showed more relevant posture and reactions for communication (p<0.05). In general, 5-8 years old children seemed to perceive the robot more as a human being compared to older children (assessing if the robot is alive or not, is it real or not, its natural movements etc). Most of the children didn't consider Pepper as a human-being from the appearance.

Conclusion: Data from CRI showed that we could use robots for therapeutic purposes, as children see the robot as a safe and interesting companion, eliciting and allowing long-term engagement. Children with ND considered Pepper more safer compared to healthy peers. Direct communication with the robot ensures more effective interactions.

O051

Longitudinal changes of white matter engagement in resting-state functional MRI in healthy older adults

H. Zhang (Hong Kong/HK), X. Tao (Hong Kong/HK), D. H. K. Shum (Hong Kong/HK)

Background: The blood oxygenation level dependent (BOLD) signals in white matter (WM) have been ignored for an extended period and they are regarded as a nuisance covariate to be regressed out in fMRI preprocessing pipe (1). Examining the BOLD signal of white matter (WM) could provide insights into brain function that involves connections between grey matter (GM) in different regions (2,3).

Objectives: Forty healthy elderlies at two time points (3 years apart, from the Harvard Aging Brain Study) (4) to calculate the differences between the visits to examine the age effect of white matter engagement maps.

Methods: Preprocessing of fMRI data followed the procedure (2). The detailed process for obtaining engagement maps is illustrated in Figure 1. It started with the definition of a population-based (PB) averaged grey matter (GM) node and WM mask. Normalized probabilistic GM masks were generated by averaging all subjects and binarized with a threshold (>0.6) to accommodate more voxels in the mask. The definition of GM nodes was obtained by multiplying GM masks with the Automated Anatomical Labeling (AAL) atlas, which divides GM masks into 90 macroscopic brain areas. Conversely, a similar process was applied to obtaining PB-averaged WM masks but with a tighter threshold (>0.95). The full correlation matrix M is the connectivity of all pairwise nodes of GM. The partial correlation matrix M'x is the temporal correlations among all pairwise nodes of GM, where the time series of every WM voxel is controlled. The global network connectivity metrics G(M) and G(M'x) are the matrices M and M'x averages, respectively. The difference between G(M) and G(M'x) represents the global functional engagement of WM voxel x with respect to the whole network. During the partial correlation estimation stage, the time series of a voxel x was shifted forward by one frame to compensate for a 3-second delay of WM signals relative to GM. A paired t-test was used to compare the engagement maps between groups (2nd -1st visit), and significance was set at p<0.05, cluster size > 10 voxels.

Results: Demographic information can be found in **Table 1**.

O051 Table 1. Demographic information

Characteristics	Subjects scanned in both visits	
Number	40	
Sex (F/M)	20/20	
Education	16.33±2.50	
	1st visit	2nd visit
Age	72.81±6.04	75.88±5.99
PACC96	0.08±0.66	0.27±0.66

According to JHU ICBM-DTI-81 White-Matter Labels (5), there is decreased engagement in several regions at the 2nd visit: the right anterior thalamic radiation, the right superior corona radiata, and the left inferior fronto-occipital fasciculus. However, there is increased engagement in the left hippocampus (see **Fig 2**).
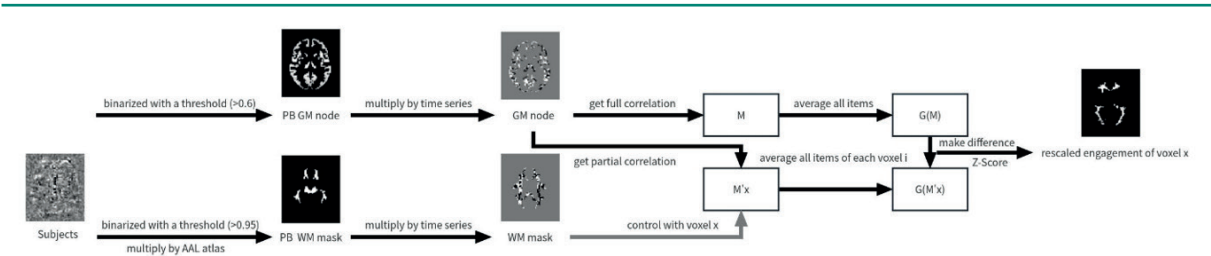
O051 Fig. 1. Workflow for obtaining white matter engagement maps
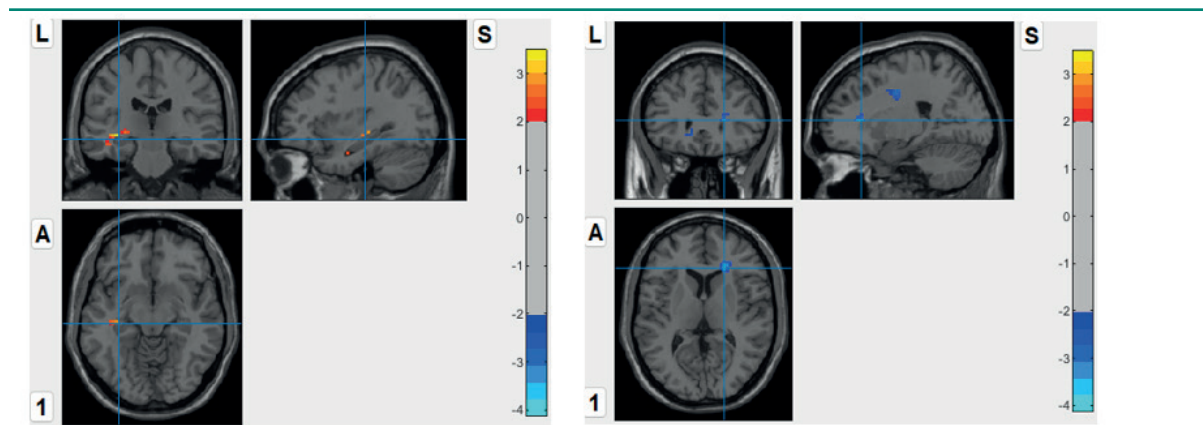
O051 Fig. 2. The results of paired *t* test between two visits (2nd visit – 1st visit)

References:
1.Yan C, et al. Frontiers in systems neuroscience 2010:13.
2.Li M, et al. Neuroimage 2020;220:117096.
3.Ding Z, et al. PNAS 2018;115(3):595-600.
4.Dagley A, et al. NeuroImage 2017;144:255-258.
5.Oishi K, et al. Neuroimage 2008;43(3):447-457.Z

O052

Experiences made during the RCT "OptiNIV" and the potential to improve healthcare for those in need for long-term intensive care nursing at home

D. Liedert (Burgau/DE), T. Olander (Burgau/DE), D. Götze (Munich/DE), N. Vallejo (Burgau/DE), L. Willacker (Munich/ DE), B. Einhäupl (Munich/DE), A. Bender (Burgau/DE, Munich/DE), T. Platz (Greifswald/DE)

Introduction: In Germany, the community-based healthcare (CBHC) of neurological patients requiring intensive nursing care is part of the national healthcare structure. Mainly a tracheal cannula (TC) or a form of ventilation leads to intensive CBHC. After discharge from inpatient early neurological rehabilitation (NR), this patient clientele receives 24-hour nursing in CBHC, paid for by public health insurance. This is an exceptional standard in Europe. In the long term, however, despite this care, there is no evidence of weaning from ventilation or tracheal cannula in the CBHC setting. Nationwide, utility costs for the service amount to approximately €4 billion annually. In this context, the study project "OptiNIV" aims to improve the long-term treatment outcome of these patients by successfully weaning them off mechanical ventilation/TC.

Method: OptiNIV is a multicentre, randomized, clinical intervention study with control group investigating the health status of neurological patients discharged from NR to CBHC with mechanical ventilation/TC at six visit time points within one year. Under the direction of LMU Munich and in cooperation with health insurance companies, patients are recruited in a Bavarian-wide network of participating NR centres. The University Medical Center and the University of Greifswald are performing an independent scientific evaluation. The primary outcome measure will be the rate of weaning from mechanical ventilation/TC during the course of the study. In addition, clinical parameters on the care situation of the patients and health economic factors will be analysed. Patient relatives and CBHC staff will also be asked about their satisfaction with the care situation. Patients in the intervention group are visited a minimum quarterly by outpatient specialist follow-up teams (OSFT) at their place of residence. In addition to these visits, OSFTs interact regularly with outpatient providers and make treatment recommendations. Intervention also includes interdisciplinary structured inpatient assessments to identify potential for weaning and neurological interval rehabilitation for actual weaning.

Results: The OSFT at the Burgau Therapy Center presents initial experience reports and interim results at the interface between inpatient and community-based neurological intensive (nursing) care. After only a few visits, the challenges faced by patients and community-based care providers within the CBHC-structure became apparent. At the same time, a broad spectrum of possible optimization potentials became visible that are not exploited within the framework of the existing standard care.

Discussion: Success rates of weaning, health status, cost efficiency compared to usual care as well as satisfaction of relatives and CBHC staff will be better understood. Based on the results of the OptiNIV project, a new form of transsectorial interdisciplinary care for patients with mechanical ventilation/TC will be established in CBHC.

O053

Quality of life and participation of adults with spinal muscular atrophy: QOLSMA

S. Ribault (Lyon/FR), P. Rippert (Lyon/FR), L. Le Goff (Lyon/ FR), M. D. Morard (Lyon/FR), A. Barrière (Lyon/FR), E. Bernard (Lyon/FR), A. Pegat (Lyon/FR), F. Boyer (Reims/FR), C. Vuillerot (Lyon/FR)

Introduction: Spinal muscular atrophy is a hereditary motoneuron disease caused by a mutation of the SMN1 gene, which is at the origin of a progressive limb and axial motor deficiency. It concerned 700 adults in 2018. The specificities of the quality of life of adult patients with SMA remain poorly described, as well as its link with participation as defined by the World Health Organization in the International Classification of Function.

Objectives: The main objective of this study is to assess the quality of life of SMA patients in France. The secondary Objective is to evaluate the determinants of quality of life in adult SMA patients.

Material and methods: Adult individuals with a diagnosis of SMA (type 1, 2, 3 or 4) who gave an informed consent were presented with an anonymous online questionnaire containing questions about medical and demographic data, the SMA independence scale (SMAIS), the QOLgNMD scale, the Rosenberg self-esteem scale, and questions regarding patients' participation.

Results: Between October 2022 and March 2023, 75 individuals were included (6 SMA type 1, 46 SMA type 2, 23 SMA type 3). 150 participants are expected at the end of the recruitment. In this interim analysis (n=75), 61% were women. 39% were receiving Risdiplam or Nusinersen. 54% were not receiving any respiratory support. 9.8% were ambulatory, 85.9% used an electric wheelchair, and 4% could not move around without help. 84.5% of patients presented pain. Patients' stress level on a visual analogic scale was assessed (mean 5.2 (2.9)). Mean (sd) Brooke and Vignos scores were 3.55 (1.5). and 8.1 (2.0), respectively. Mean SMA independence scale (SMAIS) score was 49.4/116 (32.7). Mean QOLgNMD ordinal score was 12/18 (4) for the impact of physical symptom domain (interval score 51.34/100 (9.07)), 11/24 (5) for the self-perception domain (interval score 46.22/100 (8.4)), and 14/27 (5) for the activities and participation domain (interval score 46.03 (6.64)). There was no correlation between quality of life and upper or lower limb motor function assessed by the Brooke and Vignos scale. The SMAIS score was not correlated to any domain of quality of life. The 3 domains of the QOL-gNMD were significantly correlated with the presence of pain, the level of stress, the Rosenberg self-esteem scale and the satisfaction with life scale. Regarding participation, 15% of patients were practicing a physical activity. 48% had a professional activity, and 75% completed higher education. 33.4% were living alone, 49.1% were in a relationship. 31.6% had children.

Conclusion: This interim analysis allows us to estimate the quality of life of adult SMA patients. Motor function and independence do not appear to be determinants of quality of life. Stress level and pain impact quality of life. The assessment of the determinants of quality of life is critical to propose clinically relevant outcomes for the evaluation of pharmaceutical and non-pharmaceutical interventions.

O054

Grip strenght and carpal tunnel: What interest in management?

N. S. Diagne (Dakar/SN), S. Ndeye Amélie Makarame (Dakar/SN), M. Fatou Diallo (Dakar/SN)

Introduction: Carpal tunnel Syndrome is the most common tunnel nerve compression, syndrome. Treatment of Carpal Tunnel Syndrome depends of types CTS. Conservator treatment used in sensitive forms and Surgical decompression reserved at motor forms. Hook grip strength could diagnosed severity and made easy therapeutic decision.

Objectives of this preliminary study, was to determine strenght grip characteriscs in severity carpal tunnel groups.

Materials and methods: We conducted a 3-month cross-sectional, multicenter study including patients with unilateral carpal tunnel syndrome. Hook grip strength was measured in all patients by a dynamometer with a maximum force of 90 kg on both sides and Functional capacity evaluated by Functional Severity Scopre of Boston.

Results: We collected 20 patients. Median age was 51.55 years. Main clinical signs found were nocturnal acroparesthesias (100%) Tinel (65%), Phalen (40%). A minim decreasy nerve velocity was systematically accompanied by normal grip strength while severe associated of 15.5% severe decreasy strength. Normal grip strength was found in 2/3 of patients with conservator treatment and surgicals patients. Severe and moderate decrease strength found respectively in patients with an ESF score between 2 and 3 (29%) and greater than or equal to 3 (100%).

Conclusion: Severity of a CTS electroneuromyographic level is not systematically associated with a severe decrease in grip strength. Including measurement of grip strength in the evaluation of severe SCC, can make better selection of surgical forms.

O055

Equine-assisted Therapy (EAT) in Parkinson's disease – A Pilot Study

S. Georg (Cologne/DE), A. Katharina (Cologne/DE)

Background: Relliable literature concerning Idiopathic Parkinson`s Syndrome IPS and EAT is not availabel. Exept of single-case- or single-center-reports, there are no data prooving special effects of EAT in Idiopatic Parkinsons Disease, and how to test those efffects. German guidelines for IPS recommend Exercise Therapy, but there is no reimbursement of EAT by health insurances according to absence of evidence based studys.

Study Design: According to in - and exclusion criteria, 20 Patients with diagnosis of IPS were included in a controlled, randomized, prospective and mulicenter trial. A randomization was performed in two groups each with 10 subjects. The Therapy group (10) received 12 units of EAT in 6 weeks, further treatment was continued as before in both groups. Neuro-psychologic examination was performed in all patients at inclusion time and after end of therapy. Statistic analysis and Power tests were performend for every result of cinical examination or questionaire to evaluate its relevance used in this special appliance.

Results: In spite of few patient numbers, up to high-signifikant improvements could be documented in the Therapy group (MDS-UPDRS part 3, Global Spontaneity and movement scores and Postural Stability). Further tests showed strong trends esp. for Rigor and Tremor; no deteoration was observed. Transfer in less severe stages were registered in Hoehn&Yahr- and Martinez-Martin-ratings. We found great acceptance for this special form of treating symptomes of IPS in our patients. The value of different test could de rated under the question of their usability in further trials.

Conclusion: We could demonstrate high benefit from EAT in patients with IPS. Fundamental findings were achieved for setting of the intended main trial including 100 subjects. The chosen study design was confirmed as usable, and as a way to improve reliability of data, the accessory criterium of main study designe will be examiner-blinded.

Keywords: Parkinson disease, RCT, IPS, equine assisted therapy EAT, physical activitym motor control

O056

Urinary Tract Infections in patients with acquired brain injury, an experience from a long-term acute-care neurorehabilitation center in Spain

J. Basualdo (Las Palmas de Gran Canaria/ES), C. Bahamonde (Las Palmas de Gran Canaria/ES), E. Wood (Las Palmas de Gran Canaria/ES), J. Vucetic (Las Palmas de Gran Canaria/ES), D. Graffigna (Las Palmas de Gran Canaria/ES), M. Murie-Fernández (Las Palmas de Gran Canaria/ES)

Background: healthcare-associated infections (HAIs) have become a matter of concern in all hospitals worldwide. Urinary tract infections (UTIs) are the second most frequent HAIs. Previous studies have described local prevalence of HAIs and UTIs in long-term care facilities. However, there is insufficient data about specialized centers that attend patients in post-acute situations with high risk of acquiring infections related to their underlying condition, such as stroke or spinal cord injury.
Objectives: to determine the prevalence of urinary tract infections (UTI) and catheter associated (CA) UTIs in patients that require early neurorehabilitation in a specialized center. To describe the functional status of such patients. To estimate the antibiotic cost of treatment of UTIs in such patients.
Method: retrospective observational study where we analyzed all the patients admitted to our center from 2020 to 2022. A precise assessment of the functional status of patients was obtained from clinical records of a multidisciplinary team of experts. Urine cultures were obtained and processed using standard microbiology techniques.
Results: from 2020 to 2022 our center treated 110 patients with acquired brain injury, of whom 28(25,5**%**) had a positive urine culture during hospitalization and 26(23,3**%**) had an UTI or CA-UTI. The mean age was 57 years old (SD±16,4), 53,6**%** were male, 46,4**%** were female. The reason for admission was early neurorehabilitation after stroke (42,9**%**), spinal cord injury (35,7**%**), head trauma (14,3**%**) or others (7,1**%**). The mean duration of hospitalization was 135 days (SD±76,4). The Barthel Index Score median was 10/100. The Functional Independence Measure median was 56/126. 57,1**%** had neurocognitive dysfunction, 17,9**%** had urinary sphincter control and only 7,1**%** could walk (with assistance) at the time of admission. 35,7**%** had a permanent urinary catheter in place at the time of admission. Patients with spinal cord injury were classified according to ASIA score: 40**%** ASIA A; 30**%** ASIA B; 20**%** ASIA C; 10**%** ASIA D. Of the 28 patients with a positive urine culture, 18 patients had UTI(64,3**%**), 8 patients had CA-UTI(28,6**%**) and 2 patients had CA asymptomatic bacteriuria (7,1**%**). Gram negative bacteria (GNB) account for 88,5**%** of UTIs, of which 56,5**%** produce ESBL. The average antibiotic cost of an UTI was 101,33 EUR.
Conclusion: To the authors knowledge, this is the first prevalence study to accurately describe the distinctive features of patients with acquired cerebral injury and UTI. In this special type of patients we feel the need to underscore that signs and symptoms of UTI and CA-UTI are far more heterogeneous than in standard population, specially in patients who have high dependency, neurocognitive dysfunction, or that are unable to walk, hidrate or maintain self-hygiene by themselves. Clinicians should be aware of these particular features and be able to adjust accordingly, in order to prompt diagnostic testing and treatment in a quick manner.

O058

Patient satisfaction and long-term outcomes after bionic reconstruction of the upper extremity

A. Bösendorfer (Vienna/AT), L. A. Hruby (Vienna/AT), A. Pittermann (Vienna/AT), C. Gstöttner (Vienna/AT), G. Längle (Vienna/AT), B. Baumgartner (Vienna/AT), O. C. Aszmann (Vienna/AT), A. Sturma (Vienna/AT)

Introduction: Patients with severe injuries of the upper extremity including global brachial plexus injuries may present with negligible sensorimotor function, which restricts daily life activities and impair overall quality of life. Due to limited treatment options, the concept of bionic reconstruction was developed, which includes the elective amputation of the functionless limb and its prosthetic replacement. Here, we aim to elucidate long-term outcomes and, in particular, satisfaction rates after bionic reconstruction.
Methods: Patients who had undergone bionic reconstruction at our center were invited to fill out an online survey including questions on self-sufficiency, satisfaction, prosthesis use and pain. Responders were additionally invited for functional testing as well as standardized questionnaires evaluating subjective hand function, independence in daily life and quality of life.
Results: A letter of invitation was sent to 27 patients, of whom eleven (41 **%**) completed the survey. The median time since the amputation in this group was 7 years (range, 3 to 13 years). All eleven participants (100 **%**) reported to choose bionic reconstruction again, if they were to be in the same situation. Satisfaction with their previous decision to undergo amputation of their limb was 100 [IQR, 96 - 100] and 99 [IQR, 82 - 100] for the entire process of bionic reconstruction on a visual analogue scale (VAS). General self-sufficiency was rated 87 [IQR, 84 - 100]. Seven participants (64 **%**) reported to use their myoelectric prosthesis on a daily basis. Five patients were available for functional testing and patient-reported outcome measures. The median long-term ARAT score was 40 [IQR, 31,5 - 44,5], 72 for the SHAP test [IQR, 52 - 76,5] and 10 for the DASH score [IQR, 1,6 - 25,4]. Physical and mental component summary scales assessed with the SF-36 were 56,6 [IQR, 35,5 − 58] and 55,8 [IQR, 52,6 - 60,5], respectively.
Discussion: Satisfaction rates with amputation and bionic reconstruction were high in the studied population. Patients were independent in daily life and the majority used their prosthesis on a regular basis. As a conclusion, we highlight important aspects in the recruitment of eligible candidates interested in the procedure of bionic reconstruction.

L POSTERS

LP001

Neuropsychological and anatomical-functional effects of Transcranial Magnetic Stimulationin post-stroke patients with Cognitive Impairment and Aphasia: Systematic review.

I. Pezoa-Peña (Chile/CL), T. Julio – Ramos (Santiago/CL, Valparaiso/CL), I. Cigarroa (Santo Tomás/CL), D. Martella (Sevilla/ES), D. Solomons (Santiago/CL), D. Toloza – Ramirez (Santiago/CL)

Background: Transcranial magnetic stimulation (TMS) has been found to be promising in the neurorehabilitation of post-stroke patients. Aphasia and Cognitive Impairment (CI) are prevalent post- stroke; however, there is still no consensus about the characteristics of interventions based on TMS in this clinical population and their neuropsychological and anatomical-functional benefits. Therefore, studies that contribute to creating TMS protocols for these neurological conditions are necessary.

Aim: To analyze the existing evidence of the neuropsychological and anatomical-functional effects in post-stroke patients with CI and aphasia, and determine the characteristics of the most commonly used TMS in research.

Methodology: The present study followed the PRISMA guidelines and included articles from PubMed, Scopus, Web of Science, ScienceDirect, and EMBASE databases, published between January 2010 and March 2023.

Results: Fifteen articles were reviewed. It was found that attention, memory, executive function, language comprehension, naming, and verbal fluency (semantic and phonological) are the neuropsychological domains that improved post-TMS. Moreover, TMS in aphasia and post-stroke CI contribute to greater frontal activation (in the inferior frontal gyrus, pars triangularis, and opercularis), and temporoparietal effects were also found. The observed effects occurred when TMS is implemented in repetitive modality, at a frequency of 1 Hz, in sessions of 30- minute and for more than two weeks.

Conclusion: The use of TMS contributes to the neurorehabilitation process in post-stroke patients with CI and aphasia. However, it is still necessary to standardize future intervention protocols based on accurate TMS characteristics.

Keywords: Transcranial Magnetic Stimulation, Stroke, Aphasia, Post-stroke cognitive impairment, Brain activation, Neuropsychology.

LP002

Pathways at Hull in UK

P. Deshpande (York/GB), H. Willson (York/GB), A. Baglin (York/GB)

Case study, a 56 y old man was injured while working with a traumatic brain injury, had bilateral subdural haematoma needing burr hole surgery. He was discharged home from hospital with community physiotherapy, occupational therapy and improved with his functioning and is now back to work.

Pathways at Hull in UK

- Acute Care-Hull Royal Infirmary
- Post acute rehab- Complex rehab ward C1 at castle hill hospital
- Post discharge- community rehabilitation team

Advantages

- Early discharge from hospital
- Smooth transition to community
- Improving skill mix
- Prevent readmission

Collaboration

- Trauma coordinators- initial investigations at hospital
- Rehab coordinators-rehab prescriptions before discharge
- Rehabilitation specialist- out patient review
- Community rehab therapists-goals in community therapy

Why do we need collaborative working ?

- Resources are better utilised
- Improves patient outcomes
- Seamless pathways

References:

1. Health Technol Assess.2018 May; 22(33): 1–124.,Early, specialist vocational rehabilitation to facilitate return to work after traumatic brain injury: the FRESH feasibility RCT.
2. Kate Radford, Chris Sutton, Tracey Sach, Jain Holmes, Caroline Watkins, Denise Forshaw, Trevor Jones, Karen Hoffman, Rory O'Connor, Ruth Tyerman, Jose Antonio Merchán-Baeza, Richard Morris, Emma McManus, Avril Drummond, Marion Walker, Lelia Duley, David Shakespeare, Alison Hammond, and Julie Phillips
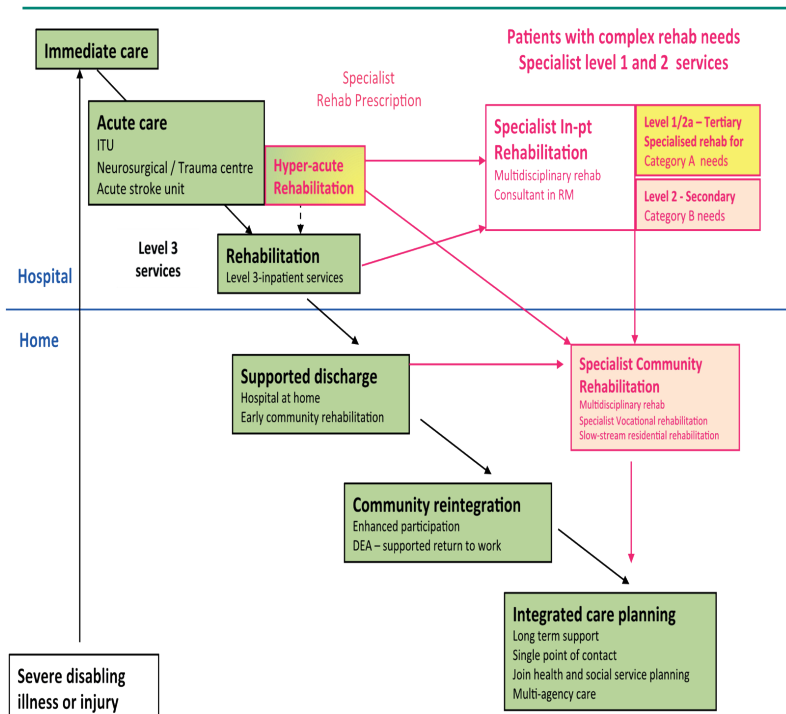
LP001 Fig. 1

LP003

Effects of a combination therapy of music-based movement, neuromodulation, cognitive training, and emotion regulation on cognition, physical and mental fitness in community older adults: a three-arm randomized controlled trial

C. Wu (Peking/CN), C. Ma (Peking/CN)

Aims: To assess the effectiveness of combination therapy of music-based movement, neuromodulation, cognitive training, and emotion regulation (MNCE) on cognitive, physical, and mental fitness in community older adults.

Methods: A single-center, three-arm, randomized trial was conducted with 175 older adults (mean age = 69.19 ± 6.47 years) recruited from the community. Participants were randomly assigned to a 12-week (2x/week, 35min/session) combination therapy (MNCE), cognitive training (CT), or control group (CG). MNCE program consists of 10 minutes of music-based movements, 15 minutes of transcranial direct current stimulation (tDCS) synchronous cognitive training, and 10 minutes of cognitive behavioral therapy-based emotion regulation. Cognitive functioning, physical and mental fitness were evaluated at baseline and post-training.

Results: As of June 11, 2023, 63 participants have completed the study (this study is still ongoing and expects to complete in September 2023). Comparing two interventions with the control, a significant increase in verbal memory (F=6.76, p<0.01), One-back task accuracy (F=9.39, p<0.01), and 3-level version of the EuroQol Five Dimensions Questionnaire (EQ-5D-3L) self-rated score (F=18.53, p<0.01), was observed in the MNCE and CT. Participants in MNCE and CT had a significant reduction in One-back task time (F=14.77, p<0.01), EQ-5D-3L score (F=6.05, p<0.01), and Geriatric Depression Scale (GDS) (F=5.55, p<0.01). The time of the 6-meter walking test and Five Times Sit to Stand Test (FTSST) decreased significantly specific to the MNCE group (F=3.98, p=0.02; F=4.60, p=0.01).

Conclusions: Results suggest that both MNCE and CT may have a positive impact on memory, attention, quality of life, and depression in older adults. The MNCE also helped to improve participants' physical functioning, especially mobility and lower limb muscle strength. The sustained effects remain to be determined by the continuation of this study over the next three months. This study could serve as a model for designing future RCTs with combined non-pharmacological treatment interventions.

Keywords cognitive aging, music training, exercise, neuromodulation, emotion regulation, combined intervention

LP004

The relation between slow wave sleep and depression in patients with epilepsy

Y. Höller (Akureyri/IS), S. Eyjolfsdóttir (Akureyri/IS)

Background: Slow wave sleep duration and spectral abnormalities are related to both epilepsy and depression, but it is unclear how these effects are related to depressive symptoms in patients with epilepsy.

Methods: Long-term video-EEG monitoring was conducted in 51 patients with focal epilepsy, 13 patients with generalized epilepsy, and 9 patients without epilepsy. Slow wave sleep segments were manually marked in the EEG and duration as well as EEG power spectra were extracted. Depressive symptoms were documented with the Beck Depression inventory.

Results: At least minimal depressive symptoms were found among 23 patients with focal epilepsy, 5 patients with generalised epilepsy, and 6 patients who had no epilepsy diagnosis. Slow wave sleep duration was shorter for patients with elevated depressive symptoms (p=.013), independently from epilepsy diagnosis, antiepileptic medication, age, and sex. Psychiatric medication was associated with longer slow wave sleep duration (p=.045). Frontal sigma band power (13–15 Hz) during slow wave sleep was higher for patients without epilepsy and without depressive symptoms as compared to patients without depression but with focal epilepsy (p=.005).

Conclusion: Depressive symptoms affect slow wave sleep duration of patients with epilepsy similarly as in patients without epilepsy. Since reduced slow wave sleep can increase the likelihood of seizure occurrence, these **Results** stress the importance of adequate treatment for patients with epilepsy who experience depressive symptoms.

Keywords: epilepsy, slow wave sleep, depression, EEG sigma band

LP005

TBI and long-term outcomes; prevalence of depression after 10 years

R. Singh (Sheffield/GB), S. Mason (Sheffield/GB), F. Lecky (Sheffield/GB), J. Dawson (Sheffield/GB)

Objectives: to measure the change in prevalence of depression after admission with traumatic brain injury (TBI) and to identify any features associated with an adverse outcome Design; prospective study of TBI admissions after 10 years Subjects & Setting; consecutive admissions with TBI to a regional neurorehabilitation unit over 4yrs were monitored for the presence of depression. Individuals were evaluated at 8 weeks, 1 yr and 10yrs post-injury. Outcome was compared to patient, injury and treatment features and any associations were sought

Interventions: nil; routine behavioural modification and medication were given if appropriate

Main measures; depression was measured by Hospital Anxiety Scale with score >8 as cut-off.

Results: over 48 months, there were 1153 individuals assessed at 10 weeks, 976 at 1yr and 552 were re-assessed at 10 years(210 had died). Prevalence of depression was 55.9**%**, 34.5**%** and 32.4**%** respectively. At 10yr, 43**%** of cases had normal scores at 1yr suggesting changes in mood. On a multivariable regression, increased depression was associated with the type of lesions seen on CT scan, intoxication at injury, past psychiatric history, GCS and social deprivation score.

Conclusions: over time, depression initially decreases after TBI but stabilises after a year. It seems that many individuals have fluctuations in mood with time. It may be possible to target groups at higher risk based on population or injury features.

LP006

Gait analysis in the management of cerebral palsy: experience of the Gait analysis lab Mohammed VI University Hospital Marrakesh

Y. Abdelfettah (Marrakesh/MA), K. Chgoura (Marrakesh/MA), L. El Abbady (Marrakesh/MA), O. Ghilal (Marrakesh/MA), M. El Majidi (Marrakesh/MA)

Introduction: Cerebral palsy (CP) is a movement and posture disorder causing functional limitations due to a lesion in the developing brain. It is the most common cause of motor impairment in children. Gait analysis (GA) enables **Objective** measurement of gait by evaluating spatiotemporal, kinematic, and kinetic parameters.
Objective: To report the significance of quantitative gait analysis in cerebral palsy.
Materials and Methods: A retrospective study conducted between November 2021 and November 2022, involving 20 patients with cerebral palsy, who were under the care of our Physical Medicine and Functional Rehabilitation department, and the Gait and Motion Analysis Laboratory at Mohammed VI University Hospital Marrakesh.
Results: The mean age was 10.8 years, with 20 children (60**%** boys and 40**%** girls). The average walking speed was 0.90 m/s +/- 0.08, cadence was 105.45 steps/min +/- 4.75 and step length were 0.51 m +/- 0.05. The stance phase accounted for 60.43**%** +/- 2.04. Kinematics showed substantial variability.
Discussion: GA provides an **Objective** assessment of gait by evaluating spatiotemporal, kinematic, and kinetic parameters. Including gait efficiency and walking capacity evaluations is crucial to assessing locomotor function. Range of motion and muscle strength significantly influence walking capacity, particularly in weaker children and adolescents.
Conclusion: GA has become a vital clinical tool for more effective treatment selection. GA is fully justified as an evaluation tool for children with cerebral palsy.

LP007

Management of spasticity in patients followed at the National Center for Disability in Marrakesh: about 14 cases

Y. Abdelfettah (Marrakesh/MA), M. Bourharbal (Marrakesh/MA), M. Majidi (Marrakesh/MA), A. El Hanafi (Marrakesh/MA)

Introduction: Muscular spasticity is a common complication that arises in individuals with multiple origins of cerebral or spinal cord lesions. It often has a negative impact on motor function and locomotion, but in some cases, it may not be bothersome or even prove beneficial. Apart from the functional **Objective**, injections of botulinum toxin sometimes aim to limit the progression of muscular contractures, provide better comfort, and reduce pain during movements.
Objective: The **Objective** of this study is to demonstrate the benefits of type A botulinum toxin in managing spasticity.
Materials and Methods: A descriptive retrospective study was conducted on a population of 14 children undergoing physical medicine and functional rehabilitation follow-up at the Mohammed VI National Center for Disability in Marrakesh over an 8-month period from November 2020 to June 2021.
Results: The average age of the patients was 5.14 years, with ages ranging from 3 to 8 years. In the series, there was a male predominance of 78.57**%**. Cerebral palsy was found in 93**%** of the patients, with only one patient presenting with paraplegia following tuberculosis meningitis at the age of 5 years. The spasticity topography in the series showed quadriplegia in 7 patients, diplegia in 5 cases, and hemiplegia in 2 cases. All injections were performed with type A botulinum toxin. Ultrasound guidance was used for all injections in the patient population. The average dose used per session per patient was 250 U Speywood. The most frequently injected muscle groups were the hip adductors in 8 patients, the Soleus muscle in 5 patients, and the medial and lateral Gastrocnemius muscles in 4 patients. Most patients (71.43**%**) showed improvement in their Ashworth scores, indicating a reduction in spasticity, while 21.43**%** remained stable, and 1 patient was lost to follow-up.
Discussion: Botulinum toxin is the first biological toxin authorized for the treatment of human diseases. It belongs to the pharmaceutical class of "peripheral effect myorelaxants." After intramuscular injection, the muscles are temporarily paralyzed, leading to reduced muscular spasticity. The dosage for initial and sequential treatment sessions must be adapted to each patient, considering factors such as muscle size, location, severity of spasticity, presence of local muscle weakness, the patient's response to previous treatments, and the history of adverse effects of botulinum toxins.
Conclusion: It is now well-established that botulinum toxin injections contribute to improving ambulatory abilities in children, delaying the appearance of fixed contractures, and enhancing nursing care comfort.

LP008

Specificities of neuro-orthopedic disorders in Sjogren-Larsson syndrome: a case report

E. H. Kassimi (Souss Massa/MA), R. Elalaoui Mdaghri (Souss Massa/MA)

Introduction : Sjogren-Larsson Syndrome is a rare autosomal recessive disorder characterized by skin signs, mental retardation, spastic diplegia or tetraplegia, strabismus and congenital ichthyosis.
Aim: As there are no guidelines. This short report shows our experience in management of Sjogren-Larsson Syndrome.
Case report : we present a case with spastic tetraplegia with chronic eczema. Magnetic Resonance Imaging showed demyelinating abnormalities in neuroichthyotic syndrome confirm the diagnosis of Sjogren-Larsson Syndrome. Pathological study of biopsy from skin demonstrated superficial lymphoid cell proliferation. The immunohistochemical study was in favor of chronic eczema.Spasticity and musculoskeletal contractures are more pronounced and highly progressive, leading to joint deformations that are resistant to conventional treatments (anti-spastic medications, rehabilitation, orthopedic bracing)
Conclusion: Managing Sjogren-Larsson Syndrome poses significant challenges, especially in addressing spasticity and musculoskeletal contractures that show resistance to conventional treatments. Further research and collaborative efforts are essential to improve the therapeutic strategies for this rare autosomal recessive disorder.

LP009

Association of Spina Bifida and Cerebral Palsy: a case report

E. H. Kassimi (Souss Massa/MA), R. Elalaoui Mdaghri (Souss Massa/MA)

Introduction : Spina bifida and cerebral palsy are two distinct neurological disorders, but they can sometimes coexist in certain patients. This abstract presents a clinical case of an individual affected by both spina bifida and cerebral palsy. Spina bifida is a congenital malformation of the spinal column, while cerebral palsy is a non-progressive brain lesion that affects movement and coordination. This combination of pathologies can lead to complex clinical challenges, with variable manifestations depending on the severity and location of the lesions.

Aim: This short report shows our experience in management of Spina Bifida and Cerebral Palsy.

Case report: We report a case of a 29-month-old infant with a history of spina bifida at birth, presenting a polymalformative syndrome involving multiple-level spinal malformations resembling scoliosis and renal malformation (left renal double pyelic system), while cerebral palsy was identified at the age of 9 months due to symptoms of motor disorders and involuntary movements.

The management of this case involves a multidisciplinary approach, including medical, surgical, rehabilitation, and orthopedic interventions. Treatment aims to improve motor function, minimize complications associated with spina bifida, and optimize the patient's functional autonomy.

Conclusion: This association of spina bifida and cerebral palsy underscores the complexity of coexisting neurological disorders and highlights the importance of appropriate evaluation and management to enhance the quality of life for patients with these concurrent pathologies. Further studies and similar case reports are needed to better understand the links and clinical implications of this rare association.

LP010

Early predictors of employment status 6 months after severe traumatic brain injury – a prospective, observational cohort study in Brazil

J. Vaz Gonçalves (Vitória/BR), H. Siler Vasconcelos (Vitória/BR), C. Bernardo louzada (Vitória/BR), L. Cunha Silva Santos Ramons (Vitória/BR), T. da Silva Rodrigues (Vitória/BR), H. Souza de Almeida (Vitória/BR), R. da silva Pereira (Vitória/BR), R. Miranda Grobeiro (Vitória/BR), W. Gomes da Silva (Vitória/BR), L. Rodrigues Nascimento (Vitória/BR), F. Zanela da Silva Âreas (Vitória/BR)

Introduction: Severe traumatic brain injury (TBI) survivors often encounter challenges when it comes to social reintegration, particularly with regards to returning to work (RTW). The primary objective of severe TBI recovery is to facilitate the return to work process.

Objective: The aim of this study is to examine the clinical and sociodemographic factors associated with employment status six months after experiencing severe Traumatic Brain Injury (TBI).

Method: A prospective observational cohort study was conducted over a period of 24 months at a trauma referral hospital. Return to work was assessed via telephone interviews six months following severe TBI. The study received approval from the Research Ethics Committee of the Federal University of Espirito Santo (CAAE: 31705020.7.0000.5060).

Results: The analysis included a total of 97 subjects. The mean age was 40.3 ± 18.0 years, and 91% of the participants were male. The average Injury Severity Score (ISS) was 32 ± 12 points, and the mean duration of Mechanical Ventilation Support (MVS) was 10 ± 9 days. Fifty percent of the individuals had a low level of education. Return to work was observed in 24% of the participants six months after severe TBI, and 55% reported a lack of job security. The binomial logistic regression model revealed that physical aggression as the cause of injury, length of stay on Mechanical Ventilatory Support, and a high level of education were associated with a higher probability of returning to work six months after experiencing severe traumatic brain injury.

Conclusions: This study represents the first investigation into predictive factors of returning to work after severe TBI in Brazil. The cause of injury, duration of Mechanical Ventilatory Support, and level of education were identified as predictive factors for returning to work.

LP011

Development of an exercise program for home-based rehabilitation of the hand following a stroke using a virtual reality medium

S. Sauser (Leukerbad/CH), B. Luisier (Leukerbad/CH), M. Hagenbuch (Leukerbad/CH), C. Simon-Martinez (Leukerbad/CH)

Introduction: Stroke is the third leading cause of disability worldwide. The main sequel is hemiparesis. This has a major impact on the patient's daily life, especially when hand functions are impaired. Intensive training helps to improve dexterity. Virtual reality (VR) is an ideal tool to offer exercises that can be performed daily at home. In addition, it gives a playful aspect that maintains the motivation of the chronic patient.

Aim: To develop an exercise program for hand rehabilitation on a VR medium for chronic post-stroke patients.

Method: A literature search was carried out on the PubMed, Cochrane and Embase databases. The various elements of our program were defined using a modified Delphi method comprising two questionnaires and a round-table discussion. The latter involved the participation of experienced physiotherapists as experts, as well as the advisory opinion of patients accompanied by their caregivers. Transposition to the VR medium was carried out as part of an interdisciplinary collaboration with a computer science student. The latter was responsible for developing the program.

Results: Existing technologies and prototypes were surveyed and analyzed. A panel of six experts defined the program's use and content. Three functional movements were selected and adapted to form three exercises of increasing difficulty. One of them was conceptualized in a playful way. Mockups were created to conceptualize the software interfaces. A prototype was developed on which a first exercise was implemented and tested by the authors of the study.

Conclusion: An exercise program was developed and partially transposed onto a VR medium. All the required functionalities have been defined. Further development is required to finalize the prototype.

Keywords: virtual reality, hand, rehabilitation, stroke, home-based

LP012

Bedside hip ultrasound examination for early diagnosis and management of neurogenic heterotopic ossifications in spinal cord injury: a case report

A. Zadra (Trento/IT), G. Cervigni (Trento/IT), E. Posanti (Trento/IT), J. Bonavita (Trento/IT)

Introduction: Neurogenic Heterotopic Ossification (NHO) is a frequent complication in people affected by Spinal Cord Injury (SCI) and can lead to worse functional outcomes [1]. The causal agent is not clear although microtrauma during passive motion is a proposed initiatory mechanism. Treatment in an early phase is warranted to prevent subsequent mineralization and limitation of articular range of motion: proposed treatment regimens are NSAIDs, disodium etidronate or low field irradiation. While plain X-ray is limited in its diagnostic value because it detects late mineralization changes that are irreversible, computed tomography is limited by radiation exposure and cost and magnetic resonance imaging by cost and availability. Bedside ultrasound (US) is proven to be reliable and have good sensitivity [2].

Case description: A 54 year old male affected by spinal cord injury classified as complete (AIS A), neurological level of injury T11, was admitted to our rehabilitation unit on the 10th post-traumatic day. Two weeks later he developed deep vein thrombosis which required anticoagulation with s.c. LMWH. A week later swelling around the right hip was noted during daily rounds, we performed US that showed a spontaneous intramuscular ematoma which went into reabsorption in follow-up scans. On the left side, a week after, the patient developed swelling around the hip and thigh and showed limited range of motion in abduction. US examination revealed a vast hypoechoic area with peripheral hyperechoic organized structures on the anterior side of the hip, diagnosed as NHO in its acute phase with zone phenomenon, while plain X-ray of the hip showed no signs of NHO. Therapy with Indomethacin 50mg BID for two weeks was prescribed. US examinations in the following three weeks showed a progressively organized NHO with hyperechoic spots and shadow artifacts. Fortunately NHO did not limit articular range of motion, the patient was discharged within 4 months from the time of admission, fully independent in ADLs and IADLs. No articular surface involvement combined with functional independence meant that no surgical indication was found through case discussion with our Orthopaedic department's colleagues.

Discussion: In the case described, US was useful to establish an early diagnosis while conventional X-ray was still unremarkable, allowing for a timely intervention with NSAIDs. We maintained cautious passive mobilization to prevent loss of ROM, while avoiding extreme stretching of the structures involved that could result in indirect muscle injury and possibly further triggers for NHO formation. Future research in this field could investigate whether activity modifications or physical therapy interventions could modify disease course in NHO.

References

1. Franz S, Rust L, Heutehaus L, Rupp R, Schuld C, Weidner N. Impact of Heterotopic Ossification on Functional Recovery in Acute Spinal Cord Injury. Front Cell Neurosci. 2022 Feb 9;16:842090. doi: 10.3389/fncel.2022.842090
2. Rosteius, T., Suero, E., Grasmücke, D. et al. The sensitivity of ultrasound screening examination in detecting heterotopic ossification following spinal cord injury. Spinal Cord 55, 71 – 73 (2017). doi:10.1038/sc.2016.93

LP013

Intervention with Armeo Senso techniques and task specific training after a stroke: a case study

T. O. CIAN Zaragoza (Zaragoza/ES)

Abstract: A case study, involving 1 person with subacute ischemic stroke for 8 weeks, 5 days a week and with 1 hour of intervention, during which he received combined treatment with Armeo Senso and TST.

Material and methods: Armeo Spring and TST protocol Armeo Spring: Flexion/extension of the shoulder of the affected upper limb (coins). Abduction/adduction of the shoulder (Water the flower). Combined movement of flexion/extension of the shoulder and elbow and abduction/adduction of the shoulder (Pencil). Combined movement of shoulder and elbow flexion/extension and shoulder abduction/adduction, and finger grip (Pirates game). Task specific training: Simulate drinking water from a glass. Lift a glass of water to a level of 90º of shoulder flexion with the elbow extended. Move 5 tennis balls from the table to a box. Wipe the table with the elbow extended. Move a cone. Comb hair. The assessment tools used were: FMA UE, FIM, SIS, BBT, COPM, dynamometry and the Armeo Senso device's own measurements.

Results and conclusion: The combined intervention with Armeo Senso and TST seems to improve upper limb function in adults with chronic stroke, but studies with a larger sample size, a control group and a higher methodological quality would be necessary to determine the effectiveness and possible improvements in limb function when combining Armeo Senso and TST.

POSTERS

P001

ICF framework for assessing the upper limb motor function in ALS people: a case report

L. Januário de Holanda (Natal/BR,Toronto/CA), A. P. Mendonça Fernandes (Natal/BR), K. Evangelista Rodrigues da Silva (Natal/BR), D. C. da Silva Oliveira (Natal/BR), L. Protásio de Melo (Natal/BR), D. Alves Pinto Nagem (Natal/BR), R. A. de Medeiros Valentim (Natal/BR), E. Morya (Macaíba/BR), A. R. Lindquist (Natal/BR)

Introduction: Given the heterogeneity of Amyotrophic Lateral Sclerosis (ALS), it becomes crucial to assess the functionality of individuals affected by the condition, considering the structures and functions of the body, activity, and participation. This evaluation can be achieved through the ICF classification, which provides an integrative overview of a person with ALS.

Objectives: To analyze the UL motor function of ALS people using a functional assessment protocol designed based on the ICF framework.

Materials & Methods: This study received ethical approval from the local research committee (protocol number 25687819.3.0000.5537). One individual diagnosed with ALS, aged 82 years, was assessed using our functional assessment protocol, which comprised the following components: (1) personal data, (2) validated assessment tools for ALS, (3) assessment tools used for ALS and/or for analyzing similar outcomes in populations with other neurological and/or musculoskeletal disorders, (4) additional important questions for evaluation, not covered by the previously selected instruments (Table 1). Muscle activity was assessed using surface electromyography (sEMG) data recorded with 16 channels of bipolar wireless sensors (Trigno Wireless System, Delsys Inc., size 5 mm x 1mm; EMG Works Acquisition 4.3), capturing sEMG, accelerometer, gyroscope, and magnetometer data. Placement of the 16 sEMG sensors involved upper limb muscles. Data processing involved: (i) Removal of the first five seconds of the signals. (ii) Application of a low-pass filter with a cutoff frequency of 6 Hz (8th order), and a fourth-order bandpass Butterworth filter with a range of 20 to 450 Hz. (iii) Data normalization using the min-max values. (iv) Calculation of root mean square (RMS) values. Data normality was verified using the Kolmogorov-Smirnov test. RMS values were compared during single attempts to perform the following tasks: initial rest, gestures, manipulation of objects, and final rest. Friedman's test was employed with a significance level of 0.05. Additionally, post-hoc analysis was conducted using the Wilcoxon test to compare the tasks, with an adjusted significance level of $p \leq 0.008$.

Results: Our functional assessment protocol consisted of 132 items, with 131 items corresponding to one of the components of the ICF. The distribution of these items among the ICF components was as follows: 51.91**%** related to body structures and functions, 18.32**%** to environmental factors, 16.79**%** to personal factors, and 12.98**%** to activity and participation, as shown in Figure 1.

Conclusion: Our protocol incorporated all the components of the ICF, offering a holistic perspective on the functionality and disability of individuals with ALS. The results enable more precise and effective therapeutic planning in the short, medium, and long-term. Furthermore, these findings can serve as a basis for the development of innovative technologies tailored to the specific needs of individuals with ALS.

P001 Table 1. Demographic and clinical data obtained from functional assessment protocol based on th ICF framework

Protocol Structure	Outcome (assessment tools)	Result (s)
Personal data	Age	82 years
	Gender	Male
	Marital status	Married
	Job	Manager
Clinical data	Lateral dominance	Right dominance
	Time of symptom onset	3 years
	Area of symptom onset	Right UL
Validated assessment tools for ALS	Functionality (Amyotrophic Lateral Sclerosis – Functional Rating Scale)	37
	Cognitive (Amyotrophic Lateral Sclerosis – Cognitive Behavioral Screen)	11
	Clinical staging (King's clinical staging)	3
Assessment tools used for ALS and/or for analyzing similar outcomes in populations with other neurological and/or musculoskeletal disorders	Fatigue (Fatigue severity scale)	50
	Tone (Ashworth scale)	No alteration
	Reflex	No alteration
	Pain	Performing the movement
	Muscle activity	RMS
	User satisfaction regarding the use of assistive technology (Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST 2.0))	29

RMS

Task (s)	Initial rest			Gestures			Object handling			Final rest			p-value
Muscle (s)	Percentis (Mdn)			Percentis (Mdn)			Percentis (Mdn)			Percentis (Mdn)			
	25º	50º	75º	25º	50º	75º	25º	50º	75º	25º	50º	75º	
RLT	0,79	**1,47**	1,8	2,07	**2,98**	3,46	0,39	**0,93**	1,26	2,96	**3,32**	3,9	**0,009a; 0,004d**
LTT	2,38	**2,96**	3,39	2,49	**2,88**	3,07	0,95	**1,4**	1,77	2,15	**2,92**	3,27	**0,008d; f**
RAD	8,06	**8,81**	9,03	24,37	**28,76**	30,98	35,02	**39,38**	41,97	36,87	**41,19**	44,45	**0,001a;b;c;d; 0,045e**
LAD	17,83	**20,08**	22,14	20,97	**25,02**	28,48	36,59	**41,28**	44,81	35,26	**40,93**	42,35	**0,009c;d / 0,01d; e**
RBB	11,47	**15,61**	18,93	4,49	**6,75**	8,94	2,09	**4,34**	6,82	3,51	**5,79**	7,44	**0,002a;b;c;d**
LBB	4,38	**6,62**	8,73	8,72	**11,25**	13,58	5,02	**7,29**	8,92	4,62	**6,12**	7,84	**0,009b; 0,05d;e**
RBT	8,42	**11,27**	13,46	4,29	**6,31**	8,49	4,22	**6,87**	8,93	4,25	**7,91**	9,24	**0,05a;b;c;d**
LBT	2,77	**4,18**	5,95	3,49	**5,08**	6,87	3,86	**5,41**	7,84	4,25	**5,36**	7,38	**>0,05a-f**
RB	26,37	**30,45**	33,68	10,23	**13,7**	15,84	6,45	**10,05**	13,28	6,29	**8,87**	10,13	**0,001a;b;c;d; 0,03e**
LB	90,27	**97,82**	101,25	18,45	**24,3**	27,19	2,86	**4,77**	6,24	14,88	**19,38**	22,87	**0,001a- f**
RECRL	371,37	**389,01**	409,26	140,08	**146,1**	149,46	81,46	**88,61**	93,52	96,23	**101,45**	104,27	**0,001a- f**
LECRL	0,41	**0,86**	0,98	0,26	**0,41**	0,68	0,19	**0,36**	0,48	0,39	**0,44**	0,68	**0,004a; b; c; d**
RAPB	11,45	**15,3**	17,46	14,38	**18,04**	21,35	0,49	**0,69**	0,86	73,09	**77,7**	80,82	**0,001a; c; d; e; f**
LAPB	30,87	**33,15**	35,26	17,46	**20,79**	23,81	122,04	**145,27**	159,64	53,62	**59,98**	62,47	**0,001a; c; d; e; f**
RUT	18,62	**22,5**	24,62	35,48	**38,82**	41,22	26,12	**28,42**	30,16	54,83	**57,15**	60,22	**0,001a; c; d; e; f**
LUT	1,62	**2,16**	2,46	113,29	**126,41**	130,21	63,86	**69,12**	72,26	122,09	**126,14**	129,08	**0,001a; b; c; e; f**
Additional important questions for evaluation, not covered by the previously selected instruments	Sleep					Between 5 and 7 hours per night							

Legend: Kinds of gestures requested: elbow flexion, gesturing "OK", gesturing "Hello", pointing, asking for silence. Kinds of object handling: writing, holding a telephone, holding a bottle, brushing teeth, opening a bottle, fining grip, reaching for a ball.

P002
Wavelet-based analysis of surface electromyography at different levels of ALS clinical staging

L. Januário de Holanda (Natal/BR,Toronto/CA), A. P. Mendonça Fernandes (Natal/BR), K. Evangelista Rodrigues da Silva (Natal/BR), D. C. da Silva Oliveira (Natal/BR), S. Krishnan (Toronto/CA), D. Alves Pinto Nagem (Natal/BR), E. Morya (Macaíba/BR), R. A. de Medeiros Valentim (Natal/BR), A. R. Lindquist (Natal/BR)

Introduction: Fatigue is one of the most reported disabling symptoms in people with Amyotrophic Lateral Sclerosis (ALS), and it worsens as the disease progresses. Advancements in surface electromyography (sEMG) as a non-invasive technique for quantifying muscle activity have been explored in the sense of aiding early diagnosis of ALS. Wavelet has been widely used to analyze sEMG signals in both time and frequency domain and their ability to suggest different levels of fatigue and assist in the detection of neurological disorders, such as ALS.

Objectives: To propose continuous wavelet transform (CWT) as a tool to analyze sEMG signals of ALS people in different levels of clinical staging.

Materials & Methods: 6 patients with ALS (59.5±17.85 years) were divided into three subgroups from three stages of King's clinical staging. The demographics and clinical characteristics are provided in **Table 1**. The research was approved by the local Research Ethics Committee of the Federal (protocol number 25687819.3.0000.5537). According to the experimental design, each participant performed activities like routine activities. They underwent motion analysis from 4 sEMG sensors placed over the right and left extensor carpi radialis longus (RECRL and LECRL, respectively), and right and left abductor pollicis brevis (RAPB and LAPB, respectively). sEMG data were collected using bipolar wireless sensors (Trigno Wireless System, Delsys Inc., size 5 mm x 1mm; EMG Works Acquisition 4.3) digitized by an A/D converter of 16-bit resolution, through sensors sampled at 1111 Hz for 25 seconds. The processing step involved several procedures: (i) removal of the first five seconds of the signals, (ii) application of a low-pass filter with a cutoff frequency of 6 Hz (8th order), and a fourth-order bandpass Butterworth filter with a range of 20 to 450 Hz, (iii) data normalization using the min-max values, and (iv) CWT. Kolmogorov-Smirnov test verified data normality. CWT was compared between ALS patients in different levels of clinical staging, through the Wilcoxon-Mann-Whitney test, adopting a significance level of 0.05.

Results: Our findings suggest different levels of fatigue compared to the subgroups. **Figure 2** shows the CWT representation of sEMG data recorded on the RECRL, LECRL, RAPB, and LAPB performing the initial and final rest along time in ALS people in different levels of clinical staging. The x-axis of these figures represents the time (s) and the y-axis illustrates the frequency value (Hz), whose red highlight means the moment of greatest muscle activity. CWT indicated a higher power spectrum in all groups analyzed, mostly in ALS people in clinical staging 3 executing both initial and final rest.

Conclusion: The obtained results demonstrate the potential of CWT representations of sEMG-aided diagnosis and automatic characterization of certain ALS.

P002 Table 1. Characteristics of ALS people

No	Age (yo)	Lateral dominance (R/L)	Time of symptom onset (mo)	Area of symptom onset	Ashworth scale (0-4)	Reflex	ALS-FRS total score	ALS-FRS (Fine motor skill) (0-8)	Fatigue (FSS) (9-63)
King's clinical staging 1									
ALS1	55	R	5	Right UL	0	Normal	45	6	36
ALS2	33	R	149	Right LL	0	Normal	44	8	32
Mean±STD	44±15.56	-	77±101.82	-	0	-	44.5±0.71	7±1.41	34±2.83
King's clinical staging 2									
ALS3	50	R	43	Left LL	0	Normal	31	4	22
ALS4	76	R	136	Left LL	0	Normal	41	7	63
Mean±STD	63±18.38	-	89.5±65.76	-	0	-	36±7.07	5.5±2.12	42.5±28.99
King's clinical staging 3									
ALS5	82	R	42	Right UL	0	Normal	37	3	50
ALS6	61	R	26	Speech	0	Normal	30	7	52
Mean±STD	71.5±14.85	-	34±11.31	-	0	-	33.5±4.95	5±2.83	51±1.41
Mean±STD	59.5±17.85	-	66.83±60.35	-	0	-	38.0±6.45	5.83±1.94	42.5±15.1

yo: years-old, R: right, L: lateral, mo: month, ALS-FRS Amyotrophic Lateral Sclerosis Functioning Rating Scale, FSS: Fatigue Severity Scale, STD standard deviation, UL upper limp, LL lower limb
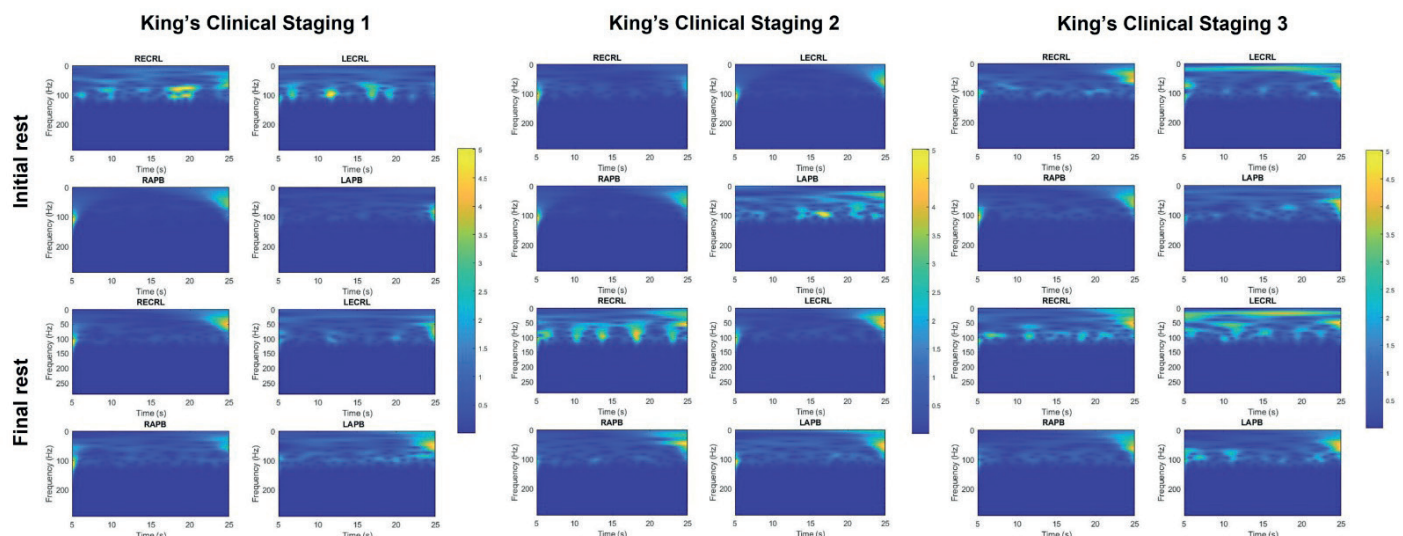
P002 Fig. 1. CWT representation of sEMG data recorded from ALS people in different clinical staging

P003

Improvement in gait pattern after BoNT-A injection in hemiparetic patients studied by gait analysis

M. Pinter (Horn/AT, Krems/AT), M. Petrovicsova (Horn/AT), Y. Teuschl (Krems/AT), A. Dachenhausen (Krems/AT), K. Matz (Mödling/AT, Krems/AT), C. Bancher (Horn/AT)

Introduction: BoNT-A is an effective treatment for spasticity. Apart from improving muscle tonus and range of motion in specific joints, injections in the lower limbs of hemiparetic patients improves subjective scales and clinical assessments of walking speed. Data on the effect of BoNT-A on functional outcomes described by spatiotemporal parameters and kinematics are rare.

Objective: This retrospective study aimed to assess the effect of Botulinum toxin A (BoNT-A) injections in the lower limbs of hemiparetic patients on gait parameters, and to explore the relationship between improvements in clinical assessments and kinematic / spatiotemporal parameters assessed by gait analysis.

Patients & methods: Hemiparetic patients with focal spasticity, admitted at a neurorehabilitation clinic from 2018 to 2021, injected with BoNT-A in the lower limbs, and with two gait analysis available (the first near the date of injection and the second 10 or more days after the injection) were included in this retrospective analysis.

Results: Data of 3 women and 6 men, mean age 50 years, with hemiparesis (5 right, 4 left) were analyzed. In total, a mean of 261.1 mouse units ± 49.6 SD of BoNT-A was injected in the affected lower extremity. After the injection, the distance walked during the 4 minutes timed walk test (TWT) had significantly improved from in median 130m (quartiles: 110; 246) to 185 m (102; 263) and the walking performance had significantly improved on a subjective scale (range 1 to 10) from 6 (6; 8) to 9 (7; 10). In the gait analysis, significant improvements were only found for the pre-swing phase of the affected leg, which decreased from 24.7**%** (19.8**%**; 31.2**%**) to 23.4**%** (19.9**%**; 28.1**%**). Improvements in the TWT were correlated with improvements in the cadence during gait analysis (Spearman rho [rs] 0.790, p=0.011). Furthermore, it correlated with parameters of the first gait analysis: Persons with shorter double stance phase (rs -0.678, p=0.045), longer single stance phase (rs 0.728, p=0.026) and shorter loading response (rs -0.845, p=0.004) on the affected side, as well as shorter stance phase (rs -0.711, p=0.032) and shorter pre-swing phase (rs -0.853, p=0.003) on the non-affected side improved more on the TWT.

Conclusions: Persons with more symmetrical kinematic gait measures before BoNT-A injections had the largest improvements in the TWT.

P004

Lokomat training gait rehabilitation after Selective Dorsal Rhizotomy in children with cerebral palsy

F. Frascarelli (Rome/IT), V. Ceccatelli (Rome/IT), G. Esposito (Rome/IT), R. Carbonetti (Rome/IT), G. Cordone (Rome/IT), V. Recchiuti (Rome/IT)

Background: Selective dorsal rhizotomy (RDS) is a neurosurgical procedure that is performed on the dorsal roots of the spinal cord at the lumbosacral level and is configured as an additional option in the treatment of spasticity in children with PCI.

Objectives: The project is aimed at improving the outcome and evaluating the efficacy of rehabilitation protocols based on intensive rehabilitation training associated with the use of the Lokomat robotic device in children with cerebral palsy (CP) undergoing selective dorsal rhizotomy surgery.

Post-surgical rehabilitation treatment is essential to recover strength and muscle control and to improve sitting, standing and walking (4).

The innovation of the present project is that of associating the intensive post-surgical treatment with training with the robotic technologies, Lokomat, available to our Neurorehabilitation Unit, with the aim of optimizing the recovery of strength, balance and walking.

Methods: Ten children with CP, aged between 4 and 10 years, with GMFCS II and III, undergoing selective dorsal rhizotomy will be recruited for the following project.

The project provides for a pre-surgical assessment as well as intensive pre- and post-training at each cycle of rehabilitation hospitalization through the administration of the following scales:

- Gross Motor Function Measure 88/66 (GMFM-88, GMFM-66)
- 6 Minutes Walking Test (6MWT)
- 10 Meters Walking Test (10MWT)
- Modified Ashworth Scale (MAS)
- Range of Movement (ROM)
- Functional Mobility Scale (FMS)
- Gilette Functional Assessment Questionnaire
- Care and Comfort Hypertonicity Questionnaire
- Wee-fim
- Gait analysis, where possible

Intensive rehabilitation training includes a first cycle of treatment to be started on the seventh post-operative day, if the post-surgical course is regular.

The individual neuromotor treatment protocol includes:

- Stretching and muscle strengthening activities of the lower limbs
- Movement re-education and movement selectivity
- Postural control and balancing activities in standing position
- Load activity, monopodalic load, load alternation
- Gait re-education and revision of orthoses and walking aids.

6-month follow-up follows: second cycle of intensive rehabilitation treatment associated with Lokomat.

The intensive training includes 20 sessions of 45 minutes 5 times a week of rehabilitation with the Lokomat robotic system, associated with traditional type training with a focus on postural balance, posture changes, standing and walking.

Results: In the period from six months post-surgery to 0ne year, results are:

- Reduction of muscle tone and increase in the range of joint movement especially in the lower limbs with consequent functional improvement
- Increased strength in the lower limbs and walking endurance
- Better use of walker and orthosis in GMFCS III
- Improved upper limb motility and trunk control
- Greater autonomy in AVQ and movements

P005

Adherence and effects of a mindfulness program conducted in a cohort of individuals living with dystonia: preliminary results from a pilot study, using a mixed-method approach

G. Le Sant (Nantes/FR), L. Brétéché (Nantes/FR), J. Doron (Nantes/FR)

Introduction: Dystonia is a neurological condition characterized by abnormal involuntary movements or postures related to sustained or intermittent muscle contractions. The aetiology of dystonia can be either primary (e.g. focal dystonia, whereby dystonia is the only clinical sign) or secondary (e.g. consecutive to a neurodegenerative/metabolic/acquired cause, such as lesions within the brain) (1). Dystonia has been conceptualised and treated in terms of the severity of motor symptoms (using botulinum toxin). However, this approach neglects other aspects of disability, like the ability to cope with physical, social or mental challenges (activities, participation and personal factors) (2). Interventions derived from mindfulness programs are becoming popular for improving distress and self-management in long-term conditions but have never been tested in people living with dystonia from primary origin (3,4).

Objectives: This study assessed the adhesion and effects of an eight-week mindfulness program in a cohort of individuals with primary dystonia, composed by group sessions supervised by a physiotherapist trained in mindfulness (1.5 hours/week) and home-based exercises, using a mixed-method approach (questionnaires + semi-structured interviews).

Materials & methods: Mindfulness, coping, self-efficacy capacities, pain, anxiety and depression, and clinical manifestations of dystonia were assessed before and after the intervention using validated questionnaires, in a sample of 9 individuals. Participants completed a diary to log information on their activities, symptoms and program observance, and were interviewed before and after the intervention. Quantitative analyses (Wilcoxon signed rank-test) were conducted to assess changes on scores. Thematic analysis was used for qualitative outcomes.

Results: The program was well-received (100%) and well-observed (78%). An improvement was found in mindfulness (p=0.012) and coping (decrease in maladaptive skills, p=0.011), a decrease in anxiety (p=0.024) and depression (p=0.013). No significant results were found for pain, self-efficacy, and manifestations of dystonia (Table1). Four themes (subthemes) were identified: clinical manifestation of the dystonia (physical, cognition, mental health); consequences of the disease (in daily life activities, driving, physical tasks); management in 'crisis situations' (coping and mindfulness skills), program analysis (satisfaction, observance and modalities).

Conclusion: This cohort study identified psychological aspects that might be improved by a mindfulness program in individuals living with dystonia. Future clinical studies should evaluate the effect of multidisciplinary approaches, incorporating mindfulness program for reducing issues in major domains of disability in individuals living with dystonia.

References:

1. Balint et al (2018) Nature Rev; (2)Morgan et al (2021) Disabil Rehabil; (3)Graham et al (2016) Clin Psych Rev; (4)Foote et al (2022) Clin Rehabil

P005 Table 1

Construct	pre-test mean (SD)	post-test mean (SD)	Mean Difference (post-test – pre-test) mean (SD)
Mindfulness: Five Facet Mindfulness Questionnaire (FFMQ)			
Observing _(8 items rated on likert scale 1-5)_	31.0 (6.0)	32. 6 (5.9)	1.6 (2.7)
Describing _(8 items rated on likert scale 1-5)_	26.6 (7.3)	27.9 (8.0)	1.3 (3.5)
Acting with Awareness _(8 items rated on likert scale 1-5)_	25.6 (6.5)	30.4 (4.4)	4.9 (6.0)*
Non reactivity _(7 items rated on likert scale 1-5)_	15.4 (3.4)	20.9(4.5)	5.5 (5.3)*
No judging _(8 items rated on likert scale 1-5)_	23.0 (9.2)	24.2 (8.0)	1.2 (4.5)
Total _(sum of sub-scales. 39 items rated on likert scale 1-5)_	121.6 (18.4)	136.0 (14.7)	14.4 (6.4)*
Coping strategies: Cognitive Emotion Regulation Questionnaire (CERQ)			
1-Self-blame _(4 items rated on likert scale 1-5)_	10.1 (3.4)	7.1 (3.6)	**-3.0 (2.4) ***
2-Acceptance _(4 items rated on likert scale 1-5)_	13.4 (5.1)	13.4 (3.2)	0.0 (3.1)
3-Rumination _(4 items rated on likert scale 1-5)_	13.8 (4.2)	11.2 (5.3)	-2.6 (4.3)
4-Positive Refocusing _(4 items rated on likert scale 1-5)_	9.2 (3.2)	12.3 (4.4)	**3.1 (3.2) ***
5-Refocus on Planning _(4 items rated on likert scale 1-5)_	13.6 (3.8)	15.1 (3.1)	1.6 (3.8)
6-Positive Reappraisal _(4 items rated on likert scale 1-5)_	10.3 (4.0)	13.2 (3.8)	**2.9 (1.5) ***
7-Putting into Perspective _(4 items rated on likert scale 1-5)_	11.8 (4.6)	12.7 (4.6)	0.9 (2.3)
8-Catastrophizing _(4 items rated on likert scale 1-5)_	9.6 (3.6)	7.0 (3.3)	**-2.6 (1.7) ***
9-Blaming Others _(4 items rated on likert scale 1-5)_	9.4 (5.0)	6.2 (3.8)	**-3.2 (2.2) ***
Global score – adaptive _(sum of 2. 4. 5. 6. 7)_	58.3 (15.9)	66.8 (13.7)	8.5 (11.5)
Global score – maladaptive _(sum of 1. 3. 8. 9)_	42.9 (14.5)	31.6 (12.8)	**-11.3 (7.5) ***
General Self-Efficacy Scale (GES)			
10 items _(rated on likert scale 1-4)_	27.7 (6.6)	31.8 (6.6)	4.1 (4.9)
Pain			
Visual analog scale _(0 to 10)_	4.6 (2.6)	4.4 (2.6)	-0.1 (0.6)
Hospital Anxiety and Depression scale			
Anxiety _(7 items rated on likert scale 0-3)_	11.4 (3.7)	7.67 (3.7)	**-3.7 (3.6) ***
Depression _(7 items rated on likert scale 0-3)_	8.2 (3.8)	5.11 (3.8)	**-3.1 (2.2) ***
Clinical manifestation of dystonia			
Involuntary movements _(likert scale 0-4)_	4.2 (1.30)	3.3 (1.6)	**-0.9 (1.3) ***
Tremor _(likert scale 0-4)_	2.4 (1.81)	2.1 (1.7)	-0.3 (1.1)
Muscle spasms _(likert scale 0-4)_	4.3 (0.7)	4.0 (0.9)	-0.3 (0.5)

Table 1 – Main results of the study. SD: standard deviation; in bold when statistically significant (*p<0.05. Wilcoxon signed rank-test)

P006

Balance improvement in Primary Progressive Multiple Sclerosis (PPMS): a case study

I. Baleia (Cascais/PT), M. Noronha (Cascais/PT), H. Santos (Cascais/PT)

Background: Primary Progressive Multiple Sclerosis (PPMS) is characterized by a progressive accumulation of neurological deficits from the onset of the disease and the development of marked and irreversible disability. 75**%** of people with Multiple Sclerosis report balance impairments, and as pharmacological therapies used to slow the progression of symptoms are scarce, it is essential that the rehabilitation of people with PPMS is focused on balance.
Objective: To describe and analyze the improvement of balance, in a patient diagnosed with PPMS, with the application of techniques to improve balance, as an integral part of a rehabilitation program in physiotherapy.
Case Description: Patient with a medical diagnosis of PPMS, whose main problems are muscle weakness in the right lower limb, of the hip flexor, abductor and extensor muscles and knee extensor muscles, hypertonia of the hip and knee flexors and plantar flexors in the right lower limb, and balance impairments.
Method: The patient underwent 13 physiotherapy sessions, over 7 weeks, with a frequency of 3 weekly sessions, lasting 45 minutes per session, focusing on balance training.
Results: There were clinically significant improvements in muscle strength, measured by the manual muscle test, and balance, measured by the Functional Reach Test and Berg Balance Scale. It is suggested to carry out studies with more rigorous methodologies, that will increase the knowledge of interventions for the rehabilitation of balance impairments in patients with PPMS, and that will enable the elaboration of guidelines with the most effective techniques.

P007

Parkinson's disease and COVID-19. What functional repercussions? About a case

R. Hebhoub (Algiers/DZ), F. Labiba (Algiers/DZ), B. Abdelatif (Algiers/DZ)

Introduction: Multiple studies have also reported possible connections between theCOVID-19 virus and Parkinson's disease (PD). This work consists of a clinical evaluation of a patient with IPD class II (Hoehn and Yarh); who was affected by the covid19. We essentially assessed balance and gait disorders using generic scales, namely perimeter and gait speed, as well as specific scales, namely the Hoehn and Yarh classification and part III of MDS-UPDRS(2). We also assessed quality of life using the PDQ-39 scales; PDQ-8 and MDS-UPDRS Part II.
Patient information and clinical funding: Mr. B. M, 75 years old, followed in PMR for one year for PD. He was hospitalized in Algiers University Hospital on december 07, 2021, because of severe acute respiratory syndrome corona virus 2 (SARS-CoV-2) infection. dry cough and muscle pain. A few days before admission, he had also noticed a loss of smell. His previous medical history included, pulmonary embolism treated daily. He was found positive for SARS-CoV-2 by use of a RT-PCR test. The last clinical assessment in MPR dates back to October 2021. He had moderate cogwheel rigidity

in the neck and in the right arm, mild cogwheel rigidity in the left arm, moderate bradykinesia in the right extremities, mild bradykinesia in the left extremities, and no tremor. The patient was treated daily by lovomed 550mg; kepnirol 1mg and amantadine 200mg gait perimeter was 1km; gait speed was 2m/s; get up and go test was 12sec; Hoehn and Yahr classification was II; the MDS-UPDRS part III score was 16 and he was entirely independent the PDQ-39 SI was 37; PDQ-8SI was 15 and MDS-UPDRS Part II follow-up neurology visit on january 17, levomed was increased to 700mg daily. Clinical examination about 45 days after covid19 infection found functional deterioration; he had severe rigidity in the neck; the right arm; moderate rigidity in the left arm; and moderate bradykinesia in the right and left extremities. Gait perimeter was 100m with helper; gait speed was 5m/s; get up and go test was 40sec with freezing; the MDS-UPDRS part III score was 43 and Hoehn and Yarh classification becomes IV. The PDQ-39 SI was 85; PDQ-8SI was 44a.
Discussion and Conclusion: This assessment shows an acceleration of the natural evolution of PD towards physical decline and dependence. This study is clinical based on specific and approved functional scales and may be indirect evidence of worsening neuronal damage. The patient was stable during the MPR follow-up of his functional status; the passage to physical decline just after infection with the covid19 virus and in short duration can prove the incrimination of this virus in the acceleration of the evolution of IPD.

P008

Cognitive dual-task training to improve balance and functional mobility in Parkinson's disease: a case study

R. Brandão (Cascais/PT), H. Santos (Cascais/PT), M. Rodrigues (Cascais/PT)

Background: Parkinson's Disease (PD) is a chronic and progressive neurological disorder that is among the diseases that most cause movement disorders worldwide. Its main motor symptoms are bradykinesia, rigidity, tremors and postural instability, which result in a decline in functional capacity. These motor symptoms can directly or indirectly affect gait, balance and transfers in patients with PD. In addition to all these commitments, these patients have an increased difficulty in performing two tasks simultaneously. This difficulty is due to the fact that individuals need to concentrate to achieve normal movement patterns, activating the premotor cortex region without using the affected basal ganglia circuit, which is deficient in dopamine. Therefore, in dual task (DT) situations, which use cortical resources to perform motor tasks, the performance of motor and cognitive components may be compromised. From this point of view, DT training should be considered as part of the rehabilitation process of these patients. However, there are still doubts about what is the best intervention protocol to follow in order to obtain positive results in functional mobility and balance.
Objectives: To describe and analyze the influence of the use of cognitive DT training, as a complement to a conventional physiotherapy intervention, in improving balance and functional mobility with cognitive DT, in a patient with PD.
Case description: The present study refers to a 78-year-old female patient, diagnosed with PD at the age of 16, associated with dementia. Its main problems are: instability and

postural changes; bradykinesia; muscle weakness; rigidity; and choreic dyskinesias, with an associated dystonic component.

Methods: The patient underwent a neurorehabilitation program for 18 days, making a total of 25 physiotherapy sessions, one hour per session. Each component of the physiotherapy intervention was associated with dual-task training.

Results: Positive results were obtained both in terms of balance and functional mobility. These improvements were demonstrated through the Mini Balance Evaluation Systems Test, the Timed Up and Go, the Timed Up and Go with Dual Task and the 360 Degree Turn Test. The results obtained proved to be favorable in the clinical condition under study. However, it is suggested to carry out future studies with rigorous methodologies that allow to prove the effectiveness of DT training in patients with this clinical condition.

P009

Intensive physiotherapy training for functional mobility in Parkinson's disease: a case study

R. Brandão (Cascais/PT), A. B. Fernandes (Cascais/PT), H. Santos (Cascais/PT)

Background: Parkinson's disease (PD) is the most common neurodegenerative movement condition. The main motor symptoms are the presence of bradykinesias, muscle rigidity, rest tremor and freezing, with an important impact in balance, gait and functional mobility. Intensive training is a suggested therapeutic approach in neurological rehabilitation, due to its neuroplastic and functional potential. Its effectiveness in PD continues to be investigated.

Objective: to investigate the improvement of functional mobility through intensive training in a PD patient. The secondary objectives aim to analyze the impact of an intensive physiotherapy training on balance and gait outcomes.

Case description: The present study refers to a 73-year-old female patient, diagnosed with PD in 2010, presenting postural instability, gait pattern alterations with freezing episodes, difficulty in activities of daily living and postural changes.

Methods: The patient underwent a 2 week neurorehabilitation program, making a total of 22 physiotherapy sessions twice a day, one hour per session. The training sessions included aerobic, strength, balance/transfer, sit to stand/gait training.

Results: Positive results were observed in functional mobility (Timed Up and Go test), balance (Mini Bestest) and gait (10 Meter Walk Test). At the end of the program the patient was able to walk for short distances under supervision and to stand up from a chair autonomously. This study reinforces the importance of an intensive physiotherapy training in the intervention for functional mobility in patients with Parkinson's disease.

P010

Dual task training and functional mobility improvement in Parkinson's disease – case study

I. Baleia (Cascais/PT), R. Gaspar (Cascais/PT)

Background: Parkinson Disease (PD) is the second most common neurodegenerative disorder and is characterized by the loss of dopaminergic neurons in the substantia nigra pars compacta. It is known that the basal ganglia are involved in the execution and control of automatic motor tasks, such as walking. With the progression of PD, movements that were previously automatic require greater attention, making it difficult to perform cognitive and motor plans simultaneously. However, despite the fact that activities of daily living often involve the performance of two or more tasks simultaneously, there is still much controversy regarding the applicability of dual-task training in the rehabilitation of patients with PD, as there is no clear indication of its effects as a therapeutic strategy.

Objectives: To describe and analyze the improvement of functional mobility with the application of an intervention based on dual-task training in a patient with Parkinson's Disease.

Methods: The study focuses on the case of a 73-year-old female patient diagnosed with PD since 2016. The main problems are centered around gait changes, decreased postural control, increased risk of falls, and consequently, decreased functional mobility. Integrated dual-task training was performed. An intervention protocol consisting of sessions of about 40 minutes was applied, 4 times a week, for 4 weeks, which made a total of 16 sessions.

Results: After applying an intervention protocol based on dual-task training was observed a decrease in the execution time of the Timed Up and Go (TUG) test and the dual-task TUG test, an increase in gait speed measured by the 10-meter walk test, and an increase in the total score of the Mini-BESTest. Despite the inevitable limitations present, the obtained Results appear to be favorable. However, high-quality studies are needed to determine the effects of dual-task training on functional mobility in the population with PD.

P011

Efficacy of transcranial direct current stimulation alone or combined with additional therapies on gait and balance in individuals with Parkinson's disease: a systematic review and meta-analysis

T. X. D. Nguyen (Taoyuan City/TW), P. T. Mai (Taoyuan City/TW), Y. J. Chang (Taoyuan City/TW), T. H. Hsieh (Taoyuan City/TW)

Introduction: Gait disturbances and balance dysfunction are key motor symptoms in individuals with Parkinson's disease (PD). Several transcranial direct current stimulation (tDCS) has been suggested to be a potential complementary neuromodulation therapy for PD. However, no systematic review has yet explored the efficacy of tDCS on gait and balance when tDCS is used as an individual treatment or combined with other additional therapies.

Objectives: We conducted a systematic review with meta-analysis to examine whether tDCS employed alone or combined with additional therapies improves gait and balance in individuals with PD.

Materials & Methods: We comprehensively searched PubMed, Embase, Web of Science, and the references of the relevant reviews. We included comparative studies performed on individuals with PD receiving tDCS alone or tDCS combined with additional therapies versus any comparator (sham tDCS, exercises, or gait training) and reporting either gait or balance outcomes. The random effects model for subgroup

analysis and pooling of overall effect sizes was used for each outcome measurement.

Results: Twenty-five studies (n=569 participants) met the inclusion criteria, of which 23 studies were eligible for meta-analysis. The pooled results demonstrated that tDCS showed moderate to large effects on gait, presented by gait speed, stride length, cadence, step length, stride time, double support time, walking time, freezing of gait questionnaire (FOG-Q); and on balance, measured by timed up and go test (TUG), Berg balance scale (BBS) and dynamic gait index (DGI). However, tDCS combined with additional therapies showed only significant improvements in cadence (standardized mean difference, SMD)=-0.666; 95% confidence interval, CI): -1.039, -0.294; p<0.001), and BBS (SMD=0.621; 95%CI: 0.014, 1.227; p=0.045); in addition, tDCS alone had statistically changes on cadence (SMD=-0.570; 95%CI:-1.075, -0.066; p=0.027), stride time (SMD=-1.262; 95% CI: -2.073, -0.450; p<0.01), and TUG (SMD=-0.335; 95%CI: -0.624, -0.045; p=0.023).

Conclusion: In summary, our findings suggest that either tDCS alone or tDCS combined with additional therapies significantly improves cadence, stride time, TUG, and BBS but has no effect on gait speed, stride length, step length, double support time, walking time, FOG-Q, and DGI. This meta-analysis provides a broad overview of the effects of tDCS on therapeutic option decision-making for gait and balance in PD, which may optimize the tDCS protocols in clinical application.

References:

1. Boonstra TA, van der Kooij H, Munneke M, Bloem BR. Gait disorders and balance disturbances in Parkinson's disease: clinical update and pathophysiology. Curr Opin Neurol. 2008;21(4):461-471. doi:10.1097/WCO.0b013e328305bdaf.
2. Lefaucheur JP, Antal A, Ayache SS, et al. Evidence-based guidelines on the therapeutic use of transcranial direct current stimulation (tDCS). Clin Neurophysiol. 2017;128(1):56-92. doi:10.1016/j.clinph.2016.10.087.

P012

(Unexpected) clinical and functional recovery in patients with chronic traumatic spinal cord injury: a case series

S. Ganvir (Ahmednagar/IN), G. Toshniwal (Ahmednagar/IN), M. Harishchandre (Ahmednagar/IN)

Background: Motor Recovery in Traumatic SCI (tSCI) is reported to reach its plateau by 1 year and maximum recovery period is reported to be 2 years. Acute rehabilitation is very well documented in literature with patients reporting for functional rehabilitation immediately after shock period is over. However, the scenario being a bit different in rural areas with comparatively less awareness about role of Physiotherapy, patients with tSCI reports at later stages ranging from 2 years to 9 years post injury. Reported here is a series of Chronic tSCI cases who showed remarkable clinical and functional recovery in short span of time.

Objective: To analyse clinical and functional recovery in patients with Chronic tSCI and to compare the patient outcomes with expected outcomes as per the specific level of injury.

Method: Patients with chronic SCI reporting for Physiotherapy treatment with minimum duration of more than 2 years were included in the study. Conventional Physiotherapy was given 5 days a week with minimum 45 mins treatment. Baseline assessment of Neurological Level of Injury(NLI), Duration of condition, duration of treatment, functional sta-

tus at admission and at discharge was recoded. Quantitative improvement was recorded with Spinal Cord Independence Measure at 1 month , 2 months and 3 months, 5 months 7 months' time points.

Results: 9 patients with 3 complete, 6 incomplete SCI in the age range of 20 years to 40 years, average duration of injury 4 years were given Physiotherapy treatment for average of 8 months. NLI did not change in 6 patients (3 incomplete and 3 complete) whereas in 3 incomplete patients NLI moved 2 segments down. Mean Change in SCIM score was 10 between admission and discharge. Functional status was compared with expected parameters and was found to have achieved 70% , suggesting had they come at early stage, expected parameters could have been achieved.

Conclusion: Clinical and Functional Recovery in patients with tSCI may occur even after 2 years post injury. However the mechanism of recovery in such chronic cases needs to be investigated so that appropriate strategies can be employed and clinical guidelines may be established.

P014

Sitting posture and pressure mapping, while using smart devices, for persons with cervical spinal cord injury in the chronic stage. Pilot study

Z. Osipova (Jurmala/LV, Riga/LV), L. Laizane (Riga/LV)

Actuality: While sitting, approximately half of the body mass is concentrated on small part of the body surface area, creating high pressure and thus the risk of pressure ulcers. For persons with spinal cord injury, smart devices provide an opportunity to engage in both work and studies, as well as to spend free time and maintain social contacts.

Question of the study: How does the sitting posture and distribution of sitting pressure change in persons with cervical spinal cord injury in the chronic stage during the use of smart devices?

Aim of the study: To analyze sitting posture and changes in the distribution of sitting pressure in persons with cervical spinal cord injury in the chronic stage during the use of smart devices.

Methods: A case analysis study. The instruments used in the study are the SCIM (Spinal Cord Independence Measure), the Braden Scale and the Occupational Questionnaire. Qualitative data are structured according to the Sitting Mobility Assessment Protocol. Photo-fixation of the participants postures was also carried out. Data about pressure distribution were obtained using the pressure measurement technology ForeSite SS. Data collected using MS Excel.

Results: All participants in the study have risk of developing pressure ulcers, as well as all participants have limited independence in self-care and mobility activities. During the use of smart devices, all study participants experienced an increase in pressure between the body and the seating surface. The highest pressure increase during the use of the smart device was detected in participant No. 1 (maximum pressure increased by 42 mmHg during use of the smart device compared to the resting state) In two of the three cases (No. 1 and No. 2), this increase in pressure was observed in the region of the tuberositas ischii. The smallest increase in pressure measurements was detected for participant No.3, it was associated with the participant's sitting posture.

Conclusion: Study participants with cervical spinal cord injury in the chronic stage experience increased pressure on the seating surface when using smart devices, which increases the risk of pressure ulcers. The seating posture of the participants affects the distribution of pressure on the seating surface.

Keywords: pressure mapping; spinal cord injury; use of smart devices; pressure ulcer; sitting posture.

P015

Association between low skeletal muscle mass and functional outcome among stroke patients

*J. Kim (Seoul/KR), J. Y. Chang (Seoul/KR), D. Y. Kim (Seoul/KR)*

Objective: This study aimed to show how the appendicular skeletal muscle mass (ASM) affects functional gain in stroke

P015 Fig. 1.

P015 Fig. 2

patients. We conducted Dual-energy X-ray absorptiometry (DXA) to measure appendicular skeletal muscle mass index (ASMI) more accurately.

Methods: We enrolled 65 patients with stroke within 2 years of onset (38 males, 27 females) who underwent the DXA to measure ASMI. DXA was performed within a month of admission or transfer. ASM was defined as the sum of the muscle mass of the 4 limbs, and ASMI was calculated as ASM/height^2 (ASM/m^2). Patients were divided into two groups, normal group and low ASMI group. Cutoff values were less than 7.0 kg/m^2 for men and 5.4 kg/m^2 for women according to the Asian working group on sarcopenia. We evaluated the modified Barthel index (MBI), Berg balance scale (BBS), functional ambulatory category (FAC), and Korean Mini-Mental State Examination (K-MMSE) at the time of admission or transfer and at the time of discharge. We compared the initial functional evaluation and functional gain, and how much the measurements changed (ΔMBI, ΔBBS, ΔFAC, ΔK-MMSE) between normal group and low ASMI group. In addition, we analyzed the correlation between ASMI and functional gain.

Results: Fifty-seven percent of patients were in low ASMI group. The score of MBI, BBS, and FAC of normal group was higher than low ASMI group at the time of the admission or transfer and there was a positive correlation between ASMI and an initial score of MBI, BBS, and FAC. Moreover, there was a significant improvement in ΔMBI and ΔFAC in normal group when compared to low ASMI group. Also, ASMI showed a positive correlation with ΔMBI, ΔBBS and ΔFAC, respectively.

Conclusions: This study shows that patients in low ASMI group have poor functional outcomes when compared to patients in normal group. In addition, ASMI is positively associated with functional gain after undergoing a stroke.
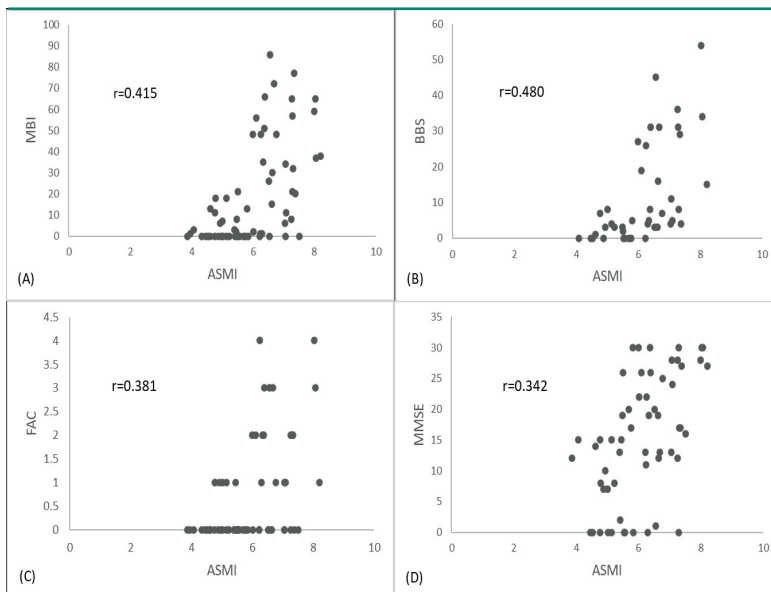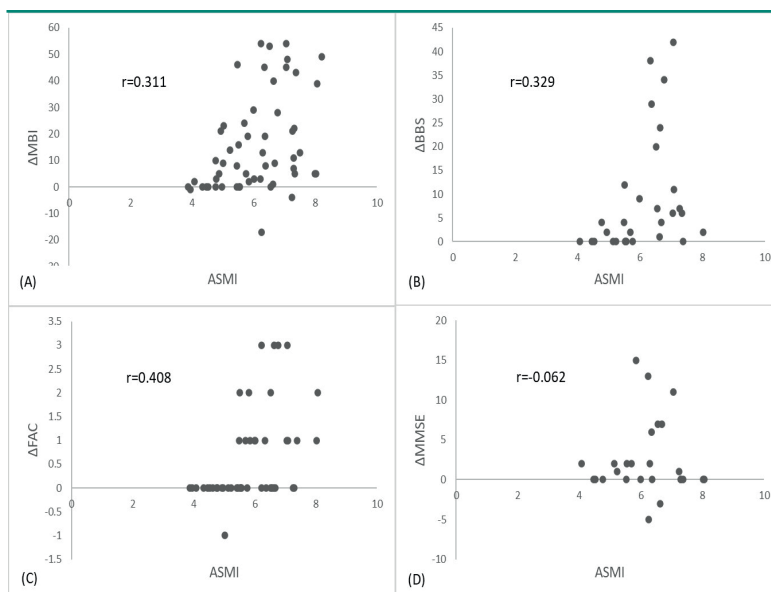
P016

Repetitive transcranial magnetic stimulation related choreic movement as an adverse effect in stroke: a case report

S. H. Ko (Yangsan/KR), H. J. Hwang (Yangsan/KR), Y. I. Shin (Yangsan/KR), H. J. Yeo (Yangsan/KR), J. S. Baek (Yangsan/KR)

Introduction: Repeated transcranial magnetic stimulation (rTMS) is considered a safe and well-tolerated procedure. However, it can cause some adverse effects shortly after sessions. The most serious adverse effect is seizure and it which has been extremely rare. In this article, we report a case of choreic movement as an adverse effect of rTMS in the patient with thalamic pain after stroke.

Case Report: 65-year-old female was admitted to our rehabilitation department for management of thalamic pain. She has a hemorrhagic stroke in the left thalamus 8 months ago **(Fig. 1)**. We applied rTMS to her drug-resistant thalamic pain after obtaining informed consent about adverse effects such as seizures. Before rTMS, her visual analog scale (VAS) pain score was 8 cm. Brunnstrom stage of the right hand was IV, and box and block test for manual dexterity were 0 points in the right upper extremity. RTMS was applied over the left M1 area of her brain using a transcranial magnetic stimulation (TMS) navigation system and a conventional figure of eight-shaped coil **(Fig. 2)**. She received 10 rTMS sessions for 2 weeks. Each session consisted of a total of 1000 pulses
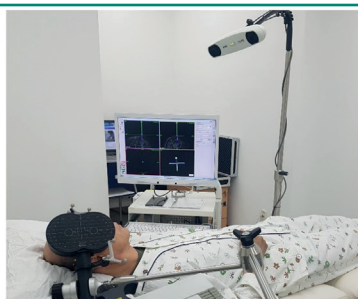
Fig. 1. Initial CT brain of the patient
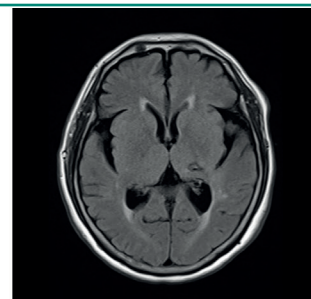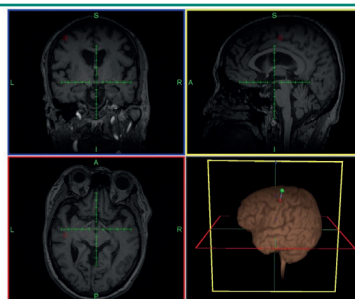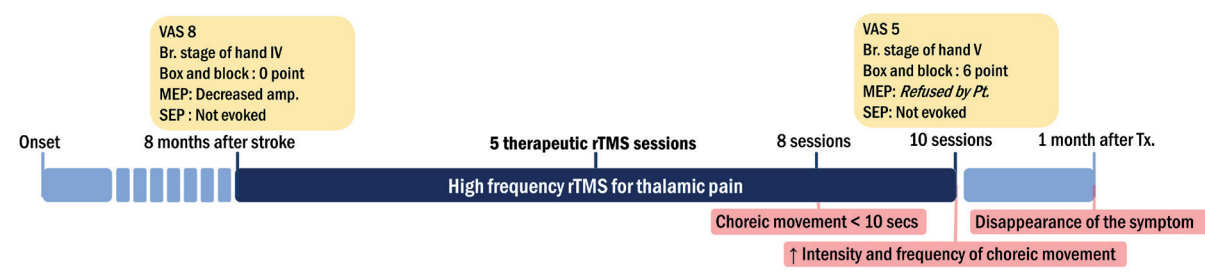
Fig. 2. rTMS navigation systems

Fig. 3. MR brain after rTMS

P016 Fig. 1–3

VAS 8
Br. stage of hand IV
Box and block : 0 point
MEP: Decreased amp.
SEP : Not evoked

VAS 5
Br. stage of hand V
Box and block : 6 point
MEP: *Refused by Pt.*
SEP: Not evoked

Onset   8 months after stroke   5 therapeutic rTMS sessions   8 sessions   10 sessions   1 month after Tx.

High frequency rTMS for thalamic pain

Choreic movement < 10 secs   Disappearance of the symptom

↑ Intensity and frequency of choreic movement

P016 Fig. 4

at 10 Hz with intensity of 90**%** of resting motor threshold (RMT) of the APB muscle for 20 minutes. She had not taken any oral dopaminergic agents before the rTMS and did not take any additional medication during the treatment. After five therapeutic rTMS sessions, her pain and hand function were improved. The pain was reduced, and the right thumb opposition became possible that she could not perform before rTMS. After 8 sessions, she reported an abnormal involuntary movement of the right hand, lasting less than 10 seconds, once a day. After 10 sessions, her pain and hand function were more improved. The VAS pain score was 5 cm and the box and block test was 6 points immediately after the treatment. However, the frequency and intensity of the abnormal involuntary hand movement were increased while the improvements in thalamic pain and hand function were maintained. We checked electroencephalography and brain MRI, but any additional abnormal finding was not detected **(Fig. 3)**. We consulted the neurologist about the symptom with a video. The neurologist diagnosed it as an episodic choreic hand movement and recommended haloperidol if the symptom worsens. The episodic choreic movement gradually decreased without medication and disappeared after one month **(Fig. 4)**.

Conclusion: Our case showed a high frequency rTMS-related choreic movement that occurred during the treatment and lasted for 1 month after treatment. This choreic movement could be assumed to be an adverse effect caused by over-stimulation of rTMS. We stimulated the same stimulation intensity for 10 rTMS sessions. The first session started with subthreshold stimulation, but if the RMT was lowered by motor improvement, it might have been changed to supra-threshold stimulation.

P017

Home hospitalization: role of rehabilitation telemedicine

P. Ferraz-Gameiro (Elvas/PT), F. Monteiro (Elvas/PT)

Background: Norm 20/2018 of 12/20/2018, published on the website https://normas.dgs.min-saude.pt/2018/12/20/hospitalizacao-domiciliaria-em-idade-adulta/, regulates practices in Home Hospitalization (HD) in adulthood in Portugal. HD is centered on the patient's needs, more humanized and without the complications inherent in conventional hospitalization, offering a quality service with clinical rigor and a holistic and humanized vision, whenever hospitalization is not necessary. In areas of low population density, access to hospital units and emergency services can be problematic. Geographical distance can lead to inequalities in access and use of hospital services in rural populations or in remote areas. Telehealth presents itself as an innovative and sustainable solution that contributes to the digital transformation strategy through the principle of bringing citizens closer to health by resolving geographic inequalities, improving access to health care. Teleconsultation is a consultation in which the health professional, at a distance and using information and communication technologies, assesses the clinical situation of a person and plans the provision of health care. The PMR telemedicine consultation meets this need. The patient hospitalized in HH has the same rights as patients in a classic hospitalization regime, with rehabilitation care being part of these rights. Telehealth should help innovate health care delivery models outside institutions, just as innovation will have to strengthen the usefulness of telehealth as a means of supporting health care delivery.

Objectives: This work aims to present a reflection on the telemedicine consultation of Physical Medicine and Rehabilitation (PMR) in HH.

Method: A state of the art search was made on Pubmed and Pedro databases, according the MeSH terms "telehealth"

and "rehabilitation". A dats caracterization of the PMR telemedicine consultation in HH made in Unidade de Hospitalização Domiciliária do Hospital de Santa Luzia de Elvas, was made.

Results: In HH, PMR teleconsultation is a necessity, as in multipurpose HH units, with the support of a Physiatrist and Physiotherapist, this resource is an added value in cases of urgent need for evaluation by the Physiatrist doctor and/or intercurrences that arise during the Rehabilitation program.

References:

1. Andersson, A., Levin, L.-Å., Öberg, B., & Månsson, L. (2002). Health care and social welfare costs in home-based and hospital-based rehabilitation after stroke. Scandinavian Journal of Caring Sciences, 16(4), 386 – 392. https://doi.org/10.1046/j.1471-6712.2002.00115.x
2. Chaiyawat, P., & Kulkantrakorn, K. (2012). Randomized controlled trial of home rehabilitation for patients with ischemic stroke: Impact upon disability and elderly depression: Home rehabilitation for ischemic stroke. Psychogeriatrics, 12(3), 193 – 199. https://doi.org/10.1111/j.1479-8301.2012.00412.x
3. Direção-Geral da Saúde. (2018a). Norma no 020/2018.

P018

Efficacy and usability of an intervention combining conventional and gamified rehabilitation exercises in highly ecological virtual reality environments: two case reports

Á. Méndez (Valencia/ES), R. Llorens (Valencia/ES), A. Borrego (Valencia/ES), M. D. Navarro (Valencia/ES), C. Colomer (Valencia/ES), J. Ferri (Valencia/ES), E. Noé (Valencia/ES)

Background: An increasing number of studies report promising results of using Virtual Reality (VR) to improve motor function after a brain injury. However, the performance of Activities of Daily Living (ADL) requires a combined execution of motor and cognitive skills in specific environments, different from the clinical setting. We have developed a VR system that enables training of ADL in highly ecological environments that simulate environments of each individual's home and require the combined use of motor and cognitive skills **(Fig. 1)**.
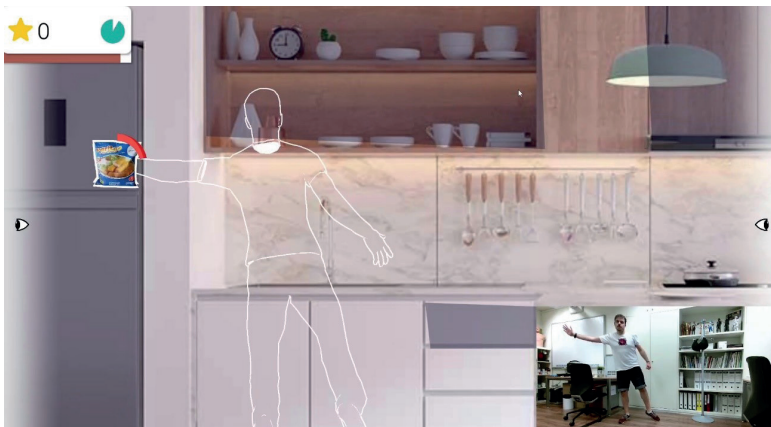
P018 Fig. 1

Objectives: The aim of the present study is twofold: first, to determine the efficacy of the developed VR system in improving balance, attention, and executive functions after brain injury; and second, to determine the usability of the system.

Materials and Methods: This study describes the case report of two patients who were admitted to a long-term neurorehabilitation unit, with a high level of dependence for the performance of ADLs, were not able to walk and evidenced cognitive deficits. Patient 1, AM, is a 65-year-old man who suffered a stroke in 2021 and was admitted to the emergency department in December 2021. A CT scan evidenced an ischemic stroke in the deep territory of the left middle basal artery. AM was admitted to the neurorehabilitation department in January 2022. Patient 2, PI, is a 34-year-old man who suffered a brain trauma in 2022. Results of neuroimaging tests in the emergency department evidenced an acute subdural hematoma. PI was admitted to the neurorehabilitation department in December 2022.

AM and PI received, between the months of March and April 2023, 17 sessions of 40 min, combining 20 min of interaction with the VR system and 20 min of conventional rehabilitation. The balance and cognitive abilities of both patients were assessed with the Berg Balance Scale and the Functional Reach Test, the Conners Continuous Performance Test-II (CPT-II) and the Color Trail Test Part A and B (CTT) before and after the intervention. The usability of the system was assessed with the System Usability Scale (SUS) at the end of the intervention.

Results: The results for both patients are shown in **Table 1**. The intervention had positive effects on patients' balance, although PI did not improve their BBS scores due to a ceiling effect. Both patients had similar results on the cognitive tests, although they reduced the number of commissions on the CPT-II, and PI, the time to complete part B of the CTT. Both patients considered the system to be usable (SUS ≥ 68).

P018 Table 1

	Patient 1 (AM)		Patient 2 (PI)	
	Before the intervention	After the intervention	Before the intervention	After the intervention
Berg Balance Scale	46	56	56	56
Functional Reach Test	24	33	32	40
Conners Continuous Performance Test-II				
Detectability	43	37	44	34
Omissions	44	44	45	43
Commissions	49	41	45	38
Reaction time	55	56	50	51
Color Trail Test				
Part A	77	71	26	27
Part B	123	124	85	75
System Usability Scale	-	87.5	-	90

Conclusion: The combined intervention of the VR intervention and conventional rehabilitation provided improvements in static balance, as well as in the ability to make fewer inattentional errors. These results, while promising, need to be corroborated in future randomized controlled studies.

P019

The use of diagnostic nerve block to predict the effect of tibial neurotomy on genu recurvatum

E. Chesne (Lyon/FR), L. Arsenault (Lyon/FR), L. Delporte (Lyon/FR), J. Luauté (Lyon/FR)

Genu recurvatum is a common after-effect in population with neurological damages. In clinical practice, gait rehabilitation can be complex due to multiple factors and different etiologies that can be involved and associated. Among them, limited dorsal ankle dorflexion is one of the major cause of

genu recurvatum. Ankle stiffness can be caused either by spasticity of the triceps surea or by muscle retraction.

It has already been shown that diagnostic nerve block with anaesthetics and selective neurotomy equally reduce spasticity and improve gait. The aim of this case study is to assess if nerve block can also be a useful tool to predict the effect of tibial neurotomy on genu recurvatum.

We report the case of a 53-year-old woman who had a traumatic brain injury resulting in a left sided hemiplegia 30 years ago. Her walking ability was mainly affected by a spastic equinovarus foot in association with a knee recurvatum and hammer toes. A diagnostic nerve bloc (DNB) was then performed non selectively on the tibial nerve. Several weeks later a selective tibial neurotomy (STN) was performed on the motor nerve branches of the same nerve.

Instrumented gait analysis were performed before and after the DBN and the STN

Results show two important points regarding to this treatment and prediction. First the DNB or STN have successfully reduced the ankle stiffness 30 years after the initial trauma. If there is no orthopedic deformity, treatment of spastic equinus foot remains then possible during a very long time. Second, regarding to the correction of the genu recurvatum the improvements obtained after DNB and STN in this case study are very similar. However, the patient suffered from temporary additional sensory loss due to the non-selective anesthesia of the nerve, it did not really affect her walking ability compared to STN. DBN can then help to determine the main cause of the limitation in ankle dorsiflexion (spasticity or muscle/tendon shortening) but also the improvements on global gait and in knee joint kinematic.

Conclusion: This case study suggest that diagnostic nerve block could be used as a valuable tool before tibial neurotomy to predict its effect on spastic equinus foot and also genu recurvatum

P020

Rehabilitation of a patient with critical illness polyneuropathy and complicated hospital course: a case report

A. Saric (Halifax/CA), R. Murphy (Halifax/CA)

Objective: To review the complicated hospital course of a patient with critical illness polyneuropathy and rehabilitation outcome.

Background: Critical illness polyneuropathy (CIP) and critical illness myopathy (CIM) are major complications that occur in severely ill patients. CIP affects 30-70 **%** of critically ill patients. Risk factors include sepsis, multiple organ failure, systemic inflammatory response, mechanical ventilation, hypotension, hypoxia, and other factors; pathophysiology is still unclear. Acquired progressive muscular weakness is the leading symptom in patients with CIP and CIM.

Methods: This case report describes a 64-year-old female who presented to the emergency department after being found unresponsive, and hypotensive secondary to urosepsis. She was diagnosed with rhabdomyolysis, acute kidney failure, Takotsubo cardiomyopathy, and candidiasis. Electrophysiological studies showed evidence of a severe length dependent sensory motor axonal polyneuropathy. Her past medical history was significant for type 2 diabetes mellitus, hypertension, and dyslipidemia.

At the time of transfer to rehabilitation her primary impairment was proximal lower extremity weakness, bowel, and bladder incontinence. During her rehabilitation stay she was not able to progress with her rehab goals due to profound weakness and worsening hip pain. Initial imaging was unremarkable; repeated imaging including CT and MRI showed progressive bilateral osteonecrosis of the femoral head. Rheumatological and infectious etiologies were not identified in initial investigations including joint aspiration and bone biopsy. Repeated surgical evaluation showed growth of Candida albicans on a swab of the left hip joint. The patient was treated with intravenous antifungal medications (echinocandins) and underwent a left Girdlestone procedure. Her pain subsequently improved.

Results: Weight bearing was stopped due to a risk of pathological fracture. During her rehabilitation stay she required mechanical lift transfer, was mobilizing independently with a power wheelchair, and required assistance with all activities of daily living.

Conclusion: The case report describes a complicated hospital course in a patient with multiple comorbidities, critical illness polyneuropathy, and bilateral femoral head atraumatic osteonecrosis. The atraumatic femoral head osteonecrosis presentation has multiple etiologies including infection, malignancy, chronic inflammation, autoimmune disorders, and chronic steroid use. Candida osteoarticular infections are most often due to hematogenous seeding and usually affect intervertebral disc and knee joints. Literature is limited in the description of femoral head osteonecrosis caused by candidiasis. Complicated hospital course significantly affected the patient's ability to participate in a comprehensive rehabilitation program.

P021

The essential tremor of the upper limbs. Which management in PRM?

R. Hebhoub (Algiers/DZ), B. Abdelatif (Algiers/DZ), F. Labiba (Algiers/DZ)

Introduction: Essential tremor (ET) is defined by the following 04 criteria:
- Isolated action tremor of the upper limbs, bilateral, it affects the fingers, hands, arms and even the shoulders.
- Duration of at least 3 years.
- With or without tremor in other places (for example: head, neck, voice or more rarely lower limbs).
- Absence of other neurological signs, such as dystonia, ataxia ...

Essential tremor constitutes a real handicap because of the difficulties encountered in the accomplishment of the gestures of daily life, inexorably impacting on the quality of social and professional life of the patients who are affected by it.

Materials and Methods: This is a prospective study with a descriptive aim, concerning patients with essential tremor of the upper limbs treated in the physical medicine and rehabilitation department.

We will start by identifying:
- Clinical: site, amplitude, and character of the tremor, and functional evaluations such as volumetric tests, writing tests whether it is the spiral or the straight line, the 9-hole test and evaluation scales such as the FAHN scale.

■ Electromyography (EMG) of the muscles that cause the tremor: for each muscle the frequency, amplitude, duration of activity and intervals between contractions are given.

At the end of this evaluation a physical therapy program will be established and will be based on the strengthening against resistance of the antagonist muscles of the muscles that are at the origin of the tremor, with a rythm of 03 sessions per week and a duration of 4 to 6 weeks, followed by a clinical and EMG evaluation at 1-3-6 months.

Results: The first results are promising on about ten patients, in whom a reduction of tremors varying between 30 to 60**%**, an improvement of the functional tests, and an improvement of the parameters recorded at the ENMG were noticed, A second maintenance program was established and given to the patients to be carried out at home, and a control appointment was given to them in order to evaluate them at 03 months from the beginning of this protocol.

Through this communication we will illustrate two clinical cases with the evaluation at the beginning and at 01 month of the treatment (photos and videos attached).

Conclusion: PMR is another alternative in the treatment of TE, either alone or in association with drug treatment. It starts with a complete clinical examination, which is essential for the identification of the different muscles predominant in the tremor, confirmed by EMG exploration, allowing the adaptation of a muscle strengthening program that will be as selective as possible and as little restrictive for the patient.

The strengthening of muscles against resistance contributes to the reduction of tremors and improves dexterity. Whether this program is targeted or global, it will require the involvement and motivation of the patients, because it is long and restrictive (from 4 to 6 weeks on average of regular work).

P022

Conditions that mechanically block shoulder movement and can be evaluated using ultrasound – considerations for dry needling under ultrasound guidance

R. Bubnov (Kyiv/UA), L. Kalika (New York, NY/US), Z. Pilecki (Zabrze/PL), G. Pilecki (Zabrze/PL)

Introduction: Conditions that mechanically block shoulder movement pose significant challenges to shoulder function. Ultrasound (US) evaluation provides a valuable tool for assessing these conditions. Dry needling under ultrasound guidance (DN-US) is an effective therapeutic approach for myofascial pain and muscle dysfunction [1, 2].

The aim was to explore the relevance of DN-US in conditions that mechanically obstruct shoulder movement, with a particular focus on the acromioclavicular joint (ACJ) [3] and other relevant factors.

Materials & Methods: A prospective study design was employed, enrolling 40 patients presenting with shoulder pain, impingement, and limited shoulder movement due to mechanical obstruction. The study excluded patients with a history of rheumatic conditions, trauma, or advanced rotator cuff injuries (stage >2). DN-US protocols were administered using a fine (28G) steel needle under ultrasound guidance by Bubnov [1]. Clinical examination, pain patterns, and ultrasound identification were used to identify trigger points (TrPs) and areas of abnormalities. DN-US was also precisely applied to tendons, fascia and ACJ [3] and other relevant structures. Motion, pain, and functional outcomes were evaluated.

Results: Preliminary findings from a cohort of patients (n=10) revealed that DN-US targeting the mechanically obstructed structures, particularly the ACJ, resulted in improved shoulder movement and decreased myofascial pain. Patients with a thickened synovium (threshold of > 5 mm) at the ACJ **(Fig. 1)** exhibited reduced effectiveness of DN-US, indicating the need for additional anti-inflammatory or rehabilitative therapies targeting the ACJ. Conversely, patients with a synovial thickness of

Conclusion: Conditions that mechanically block shoulder movement, such as ACJ involvement, can be effectively addressed using DN-US. Targeting the ACJ and other relevant structures through precise needling techniques can lead to improved shoulder function, reduced myofascial pain, and enhanced treatment outcomes. The evaluation of synovial thickness at the ACJ can serve as a predictive factor for the effectiveness of DN-US, guiding the application of adjunctive therapies. Further research is warranted to validate specific ultrasound symptoms associated with mechanically obstructed conditions and optimize the use of DN-US in personalized integrative treatment strategies.
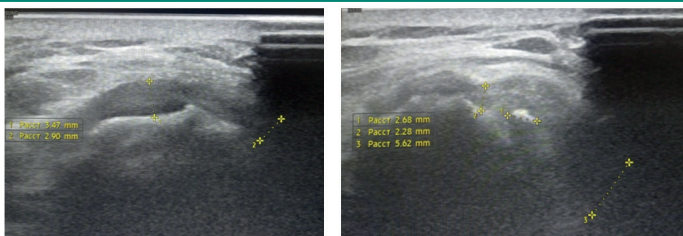
References:
1. Bubnov RV. Evidence-based pain management: is the concept of integrative medicine applicable? EPMA J 2012, 3(1):13.
2. Bubnov RV, et al. EPMA J 2014, 5(Suppl 1): A163.
3. Precerutti M, et al. J Ultrasound. 2020 Sep;23(3):317-325.

P022 Fig. 1. Acromioclavicular osteoarthritis with thickened synovium (threshold of > 5mm) as a cause of shoulder impingement. Signs of synovial hypertrophy and osteophytes in ACI osteoarthritis.
US of the right acromio-clavicular joint (right image), revealed a thickening of the tissue (synovial membranes) up to 3-7mm (on the left, up to 1-3 mm thickness – left image) is determined, in its thickness - single hyperechoic inclusions up to 1-5 mm. With functional ultrasound, movements in the right shoulder joints are limited (up to 90 degrees).

P023

A unique case of a neurological disorder – Stiff person syndrome

S. Singhvi (Ahmedabad/IN), P. Singh (Ahmedabad/IN)

Background: Stiff person syndrome (SPS) is a specific neurological condition, as it's both rare and unique. SPS is distinguished by muscle rigidity that occurs in waves with simultaneous painful and debilitating muscular spasms. Tactile or auditory stimuli can induce spasms. On electromyographic study, the patient has continuous motor activity, very similar to tetanus. The syndrome can lead to difficulty doing essential daily tasks or even painful conditions like fractures. Apart from clinical signs, some patients have positive anti-glutamic acid decarboxylase (anti-GAD) antibodies, which can also be an excellent confirmatory test for diagnosing SPS.

In this case report, we present a 36-year-old female with a long history of SPS, with positive anti-GAD antibodies, leading to her chronic dependence on a tracheostomy tube and the pulmonary complications that followed. The patient suffered from acute encephalopathy secondary to acute respiratory failure. She was placed on a mechanical ventilator due to her respiratory failure but later developed a case of ventilator-associated pneumonia. Respiratory complications have not been reported vividly with this syndrome, so this case sheds light on the same.

P024

Functional ability in Brachial Plexus Birth Palsy (BPBP)

N. S. Diagne (Dakar/SN), M. Fatou Diallo (Dakar/SN), S. Ndeye Amélie Makarame (Dakar/SN)

Introduction: Brachial Plexus Birth Palsy means brachial plexus injuries during the birthin. It is an reality in Africa, but less known in developped country (1). Functional ability depends on severity lesions and therapeutics. Overall, patients have a high rate of spontaneous recovery (66–92**%**). In Senegal, epidemiology, and functional ability of upper limb, Brachial Plexus Birth Palsy (BPBP) are unknown. **Objective**s of our study was to determine functional abitilies and prognosis factors of upper limb, after Brachial Plexus Birth Palsy (BPBP). Patients and
Methods: We conducted a retrospective study on five years, included Senegalease children with Brachial Plexus Birth Palsy. We releved with a questionary sociodemographics aspects, risk factors of Brachial Plexus Birth Palsy, clinicals, treatments, electroneuromyographics aspects. Functional ability evaluated with Mallet Classification System. It's a questionary, which appreciated fives domains (abduction, external and internal rotations, reaching to the neck, back and mounth). Thoses abilities classed in V grades.
Results: Fourty sevens patients (47) included. Mean age was 18 mounths . Sex-ratio was 1.13. Maternels risk factors of BPBP dominated by overweight of the mother (51.1**%**), lack of schooling (48.9**%**). Dystocia found in 95.5**%**. Duchenne-Erb paralysis represented (61.7**%**) and neuropraxia 34**%**. Grades III, IV, V of Mallet Classifications Systems were noted. Most found treatment in patients with BPBP was banding associated of physiotherapy (85.1**%**). Principal functional prognosis is severity of lesions.
Conclusion: Brachial Plexus Birth Palsy remains a topical obstetric condition. Functional abilities represented by Grade III, IV, V of Mallet Classification System. Principal functional prognosis factor is severity of lesions.
Keys Words: Brachial, Plexus, Birth, Palsy, Prognoisis, Mallet

References

1. B. Tchagbele et al., « Paralyse obstétricale du plexus brachial : aspects épidémiologique et thérapeutique à propos de 65 cas colligés en trois ans au CHU Sylvanius Olympio de Lomé (Togo) », Journal de Pédiatrie et de Puériculture, vol. 26, no 3, p. 141 145, juin 2013, doi: 10.1016/j.jpp.2013.01.012.

P028

A scoping review of combined relaxation or meditation with biofeedback techniques in motor rehabilitation

H. Santos (Alcabideche/PT, Cascais/PT), R. Brandão (Alcabideche/PT), A. Partidário (Alcabideche/PT), C. Penha (Alcabideche/PT), J. Almeida (Alcabideche/PT), M. Vieira (Alcabideche/PT), P. Barrento (Alcabideche/PT)

Background: Motor recovery is a major goal of physical therapy, and emerging therapeutic approaches include combining relaxation or meditation techniques with biofeedback. Biofeedback is a non-invasive technique that provides patients with real-time feedback on specific physiological functions, allowing them to understand and control changes in their physiology. Meditation and relaxation are widely used to reduce stress, anxiety, and pain, and can help reduce tension and improve circulation, aiding in motor recovery. However, there is a lack of information on the effectiveness of combining these techniques for motor rehabilitation. **Objective**s: This scoping review aims to identify the main approaches and effects of combination of relaxation or meditation with biofeedback techniques on motor function and related aspects such as pain relief in individuals with various clinical conditions undergoing motor rehabilitation. **Methods:** An scoping review of the literature was conducted, including studies published in scientific journals indexed in the Medline, Embase, Central, and Pedro databases. Studies with patients of all ages, with various clinical conditions affecting motor function, were included. The combination of relaxation, meditation, and biofeedback techniques was evaluated in terms of efficacy, types of biofeedback used, intervention duration, and outcomes related to motor rehabilitation and pain relief. **Results:** Five articles that met the inclusion criteria were included. The results indicate that combined relaxation or meditation with biofeedback techniques can be effective in treating patients with various clinical conditions affecting motor function and/or presenting pain. Two types of biofeedback were used, body temperature biofeedback and electromyography biofeedback. The intervention duration varied from seven one-hour sessions to six weeks. Outcomes included range of motion, muscular strength, gait speed, activities of daily living, time in pain, and muscle tension measured by EMG. The combination of relaxation or meditation with biofeedback can be a useful approach to help patients manage pain and improve motor function, but further research is needed to fully understand its efficacy and optimal implementation.

P029

Excitability of denervated muscles and FES cycling speed increase in the course of regular training – observations in a preliminary case study

M. Mravcsik (Budapest/HU, Pecs/HU), A. Nagy (Budapest/HU), J. Laczko (Budapest/HU, Pecs/HU), W. Mayr (Vienna/AT)

Introduction: For applying Functional Electrical Stimulation (FES) to denervated muscles, special electrical parameters and large surface electrodes are required [1]. We trained denervated muscles of a Spinal Cord Injured (SCI), using a tricycle equipped with an appropriate stimulation device [2].

Objectives: In this case study we settled a training protocol and specific stimulation parameters to improve cycling ability of one patient.

Methods: The 46 years old man had a complete SCI (AIS A) at S4-5 level. 2 months post injury, before starting tricycling exercises, he performed 10 pre-training sessions (once per week, sitting) to strengthen his quadriceps (QA) muscles using a Stimulette den2x stimulator (Schuhfried, Vienna, Austria). Biphasic rectangular pulses were applied via 200cm2 carbon electrodes in wet foam pockets, with 20ms/phase, 10ms pulse pause, and 20Hz frequency. Current amplitude was increased until full knee extension was observed. Repetitive contractions (2s on/4s off) were repeated until contraction strength started to drop, this interval increased from 10 to 17 minutes in the course of the 10 sessions. After the pre-training the weekly protocol was changed to starting with a stationary warm-up phase (QA stimulation for 5 minutes slow twitch with biphasic pulses, 50ms/phase) followed by a cycling phase on a tricycle (Reha-Funtrike, OVG, Munich, Germany). The tricycle is equipped with a custom-build stimulator delivering biphasic rectangular pulses (20ms/phase, 20Hz) to both QAs. The tricycle was operated in a "rowing" mode. In rowing mode a trigger switch is used for starting a stimulation induced knee extension, which actively drives the chain propulsion via seat movement to the back. After, without stimulation, seat and whole body are moved forward, by arm pulling at the steering bar. The cycling part of each session was divided into 3 equally long (10 minutes) time intervals with pauses of 5 minutes. For each phase the cycling distance and mean cycling speed was assessed.

Results: The average (across sessions) required amplitude for full QA contraction in the pre-training period was 55mA±5 and 60mA±9 for the left and right legs. Then, in the course of 7 cycling sessions it decreased to 50mA±7 and 49mA±8. Average (within session) cycling speed increased from 1st to 2nd and to 3rd phase of the actual sessions (5.03; 5.15; 5.11 km/h respectively). Average speed remained but maximal cycling speed decreased in the course of sessions.

Conclusion: The excitability of denervated muscles increased in the course of training sessions. This shows that the FES cycling training with QA stimulation can improve excitability of denervated muscles. The variation of speed between the 3 phases of the sessions decreased with the course of sessions. FES cycling offers sport exercises for patients with denervated muscles.

References:

[1] Mayr et al. (2002). Basic Appl Myol, 12(6), 287-290.
[2] Mravcsik et al. (2018): Proc. of 22nd Conf. of IFESS. pp. 134-136.

P030

Pain management in a severe case of two years and a half of continuous and disabling algohallucinosis

S. Lemai (Constantine/DZ), I. S. Laib (Constantine/DZ), R. S. Kelil (Constantine/DZ)

Introduction: Phantom limb pain management may become a real challenge to physicians, especially when none of the neuropathic pain medications shows any improvement through time, and we see it turn into a chronic recalcitrant pain with no apparent aggravating or causing factor.

Case description: 60 years old male, history of psychostimulant abuse, epilepsy at age 55, a year after was stabilized and detoxed. He had an accident with an agricultural machinery at work when he turned 58, resulting in a trans humeral amputation at the right arm. no complications after surgery, he had hallucinosis for three months that turned to phantom limb pain rapidly deteriorating his quality of life. was under different therapeutic classes since then: pregabalin, gabapentin, amitriptyline, duloxetine, tramadol, paracetamol... no improvement, still pain VAS 9/10, allodynia confining him completely to home and severe social distancing.

we did a complete clinical and radiological assessment, no other complications but neuropathic pain, started a rehabilitation protocol: 20mn of electrical neurostimulation +20mn mirror therapy 5days/week and reassessed at three weeks. he was left under pregabalin 150mg per day.

The detailed results of our tests before and after rehabilitation are in Figure 1. The patient completely adhered to the protocol, and was improving and stopping all pain medication at one week.

At three weeks we assisted to a spectacular improvement at all levels. the two years confined patient was now happy to go out and have social life again. allodynia disappeared.

Discussion and Conclusion: A very recalcitrant chronic neuropathic pain that showed no response to any pharmacological treatment for two years and a half was treated with simple and basic rehabilitation management, the association of TENS with mirror therapy was very satisfying for the management of the phantom limb pain. simple and cheap rehabilitation therapeutics are sometimes worth trying even in the cases that appears most difficult to manage.

P031

### Cognitive impairment is associated with gait variability and fall risk in amyotrophic lateral sclerosis

M. Spisto (Caserta/IT), S. De Marco (Caserta/IT), J. Hausdorff (Tel Aviv/IL), G. Aceto (Naples/IT), E. Salvatore (Naples/IT), P. Moretta (Telese/IT), G. Santangelo (Caserta/ IT), L. Trojano (Caserta/IT), R. Dubbioso (Naples/IT)

Background: In amyotrophic lateral sclerosis (ALS), gait abnormalities contribute to poor mobility and represent a relevant risk factor for falls. To date, gait studies in ALS patients focused on the motor dimension of the disease, neglecting the cognitive aspects.

Objectives: The aims of this study were: (i) to determine whether the presence of mild cognitive impairment (MCI) in ALS patients was associated with gait performance, especially during a challenging gait task; (ii) to identify possible cognitive predictors of future falls.

Methods: Using a wearable gait analysis device, we compared gait patterns in patients with ALS and MCI (ALS MCI+; n=18), with ALS but without MCI (ALS MCI-; n=24), and healthy individuals (HS; n=16) under two conditions: (1) normal gait (single task), (2) walking while counting backward (dual task). Memory, executive, language, and visuospatial domains were assessed using an extensive neuropsychological battery. Finally, we examined if the occurrence and number of falls in the three months following the baseline test were related to cognition (Figure 1).

Results: In the single task condition, ALS patients, regardless of their cognitive status, displayed significantly higher variability of gait features than HS, especially for stance and swing time (both $p < 0.001$). The dual task condition revealed additional differences in gait variability parameters between
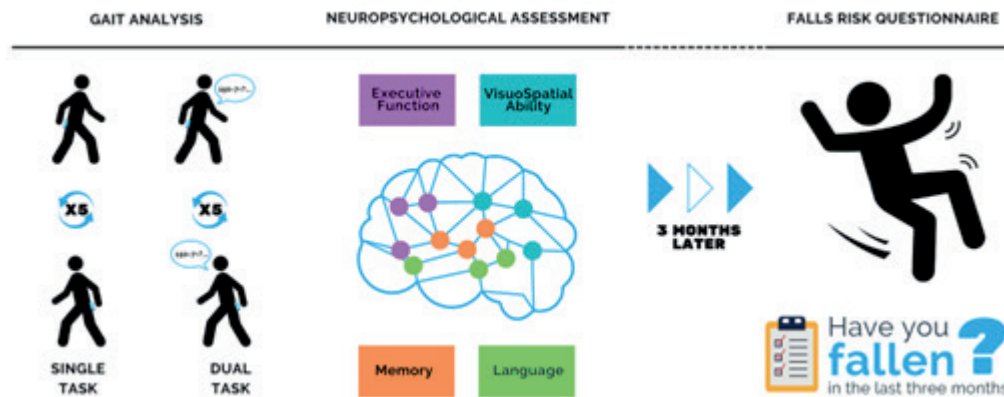
Po31 Fig. 1. Each participant underwent gait analysis by inertial system with wearable sensors attached with a semi-elastic belt to the waistline during walking back and forth five time at usual speed (single-task) and walking while performing the serial subtraction task (dual-task). Afterwards, a complete neuropsychological assessment evaluating four main cognitive domains (executive function, language, memory, and visuospatial ability) was performed to classify patients as having (MCI+) or not mild cognitive impairment (MCI-). After three months, through a dedicated questionnaire, participants were asked to report the fear of falling, the occurrence and how many falls they experienced.

ALS MCI+ and ALS MCI- for cadence (p=0.005), stance time (p=0.04), swing time (p=0.04) and a stability index (p=0.02). Moreover, ALS MCI+, compared to ALS MCI-, showed a higher occurrence (p=0.001) and number of falls (p<0.001) at the three-month follow-up. Finally, regression analyses demonstrated that mild cognitive impairment significantly predicted the occurrence of future falls (β=3.649 p=0.01) and, together with executive dysfunction, was significantly associated with the number of falls (cognitive impairment: β=0.63; p<0.001; executive dysfunction: β=0.39; p=0.03), regardless of motor impairment at clinical examination.

Conclusion: In patients with ALS, mild cognitive impairment is associated with exaggerated gait variability and predicts the occurrence and number of short-term falls, independent of motor impairment.

P032

Working-memory training in patients with aphasia

J. Horynova (Prague/CZ), M. Krivosikova (Prague/CZ), Y. Angerova (Prague/CZ)

Background: Working memory is a cognitive modality that enables to maintain information and use it to achieve different goals. It is frequently one of the impaired cognitive domains in aphasia and is known as one of the factors influencing the patient´s comprehension, esp. the sentence comprehension.

Aims: To examine different procedures of working-memory treatment and their possible use for training of patients with different types and severity of aphasia.

Methods: A case-studies design was used with a pragmatic selection of x? patients with chronic stroke-induced aphasia of different types and severity. All the patients underwent the same assessment and a one-month intensive working-memory treatment. Different treatment procedures were implemented in all the patients, with the aim to choose the most effective for each of them, according to the type and severity of aphasia.

Outcomes, results and implications: The case studies present different types of aphasia and the need of individualised and customized working-memory treatment procedures for each of the patients, according to the type and severity of the language impairment. 1-2-week post-treatment assessments show effects in the trained working memory tasks. There was little evidence of improvement in language comprehension. Yet, implications for further and large-scale research are discussed, aimed at the effects of working-memory training on language comprehension, esp. the sentence comprehension.

Keywords: aphasia; working memory; language comprehension; sentence comprehension; treatment.

P033

Physiotherapy for freezing improvement and fall prevention in a case of progressive supranuclear palsy: a case study

M. Mateus (Alcabideche/PT), M. Mateus (Alcabideche/PT, Lisboa/PT), H. Santos (Alcabideche/PT, Cascais/PT)

Introduction: Progressive Supranuclear Palsy (PSP) is a rare, late-onset, and fatal Parkinsonian syndrome, affecting approximately 7 individuals per 100,000, with a diagnosis around the age of 72 and a rapid progression, resulting in an average survival of only 5 to 7 years. This disease presents various variants, and the one affecting the patient under study is PSP-PGF (progressive gait freezing), which leads to sudden gait freezing and severe akinesia, but with essentially intact cognition. Currently, there is no cure, and treatment focuses on symptom relief. Limited evidence suggests the usefulness of Physiotherapy in improving balance, gait quality, and fall reduction.

Objective: To describe the application of a physiotherapy intervention for the prevention of freezing and associated falls in this syndrome and analyze the results obtained after 7 weeks of intervention. Case Description: Assessment and intervention utilized validated evaluation instruments and scales recommended for PSP or, in their absence, for Parkinson's Disease (PD). The prognosis focused on maintaining functionality and improving the perception of freezing impact.

Results: The expected decline in performance levels due to the inevitable progression of the disease was confirmed,

as evident in the results of almost all analyzed parameters, with the exception of dual-task Timed Up and Go (TUG) with verbal fluency. Despite more frequent freezing episodes, the patient reported a reduction in freezing impact on daily activities.

Discussion: One limitation of the study was the scarcity of available scientific evidence on the efficacy of Physiotherapy interventions in PSP. However, there appears to be ample room for the development of Physiotherapy as an adjunct in risk prevention, functional maintenance, and improvement in the quality of life for PSP patients.

Conclusion: Further comprehensive studies are needed, yet the establishment of Physiotherapy, in combination with other therapies, as interventions in PSP, appears to be important for a better future for these patients.

P034

Impact of biofeedback therapy on the psychophysical status in brain tumor patients during radiotherapy

K. Hojan (Poznan/PL), A. Pieczynska (Poznan/PL), A. Pilarska (Poznan/PL), D. Procyk (Poznan/PL), K. Adamska (Poznan/PL)

Introduction: Radiotherapy (RT) is a standard treatment for brain tumor patients. High dose of radiation used during treatment may lead to detonation physical and cognitive functions sometimes causing disability.

Therefore, the aim of this research was to verify the impact of neurorehabilitation using biofeedback method on the psychophysical fitness and quality of life (QoL) of patients with primary brain tumour undergoing RT.

Methods: To the study we included 52 patients with primary brain tumor before RT, aged 18-70y.o., from groups III and IV according to the WHO Classification of Central Nervous System Cancer in 2021, in good general conditions and who were classified as intensity-modulated photon RT. Patients were assessed using: 6-Minute Walk Test, Hand grip strength measure, Functional Independence Measure (FIM), Functional Assessment of Cancer Therapy - General (FACT-G), Fatigue (FACT-F) and Brain (FACT-Br) questionnaires, Addenbrooke's Cognitive Examination III (ACE III) test, Color Trials Test, EORTC questionnaires QLQ - BN20 and QLQ - C30. We mesured blood parameters such as morphology, CK, S100beta, neurotrophin (BDNF). The patients assessment was carried out in 3 times: before RT, after one week and 3 months after end of RT. The control group (CG) performed during onological treatment daily activity as usual. The intervention group (IG) additionally neurorehabilitation with biofeedback method.

Results: Patients from both groups present no important changes in physical fitness and QoL one week after RT to compare to baseline. After 3 months after RT patients in UG present an important (p>0.05) increase in fatigue, detoriation in QoL, and in cognitive assessment: verbal learning and memory, attention and concentration, and verbal fluency especially in usual. We did not noticed changes in S100 beta (p<0.05) in contrast to BDFN (p>0.05) between study graoup.

Conclusions: Study results may also contribute to the dissemination of new forms of rehabilitation in patients with brain tumours undergoing RT. Neurorehabilitation is one of supportive method for this group of cancer patients during oncological treatment. Additional biofeedback therapy gave more important changes in functional status in breain tumor patients undergoing RT.

P035

Effects of cardiac rehabilitation according to body mass index in low ejection fraction patients

J. H. Lee (Busan/KR), S. W. Kim (Busan/KR)

Objective: Cardiac rehabilitation (CR) is an effective secondary preventive post-myocardial infarction measure that can reduce the risk of re-infarction and cardiovascular mortality and morbidity. CR was associated with significant improvement in peak oxygen consumption (pVO$_2$) and exercise capacity among acute myocardial infarction (AMI) survivors, and those with a reduced ejection fraction (EF) have greater improvements. In previous study for chronic heart failure patients, CR has a greater effect in patients with low body weight index (BMI) than normal BMI. However, in AMI patients with low EF, the correlation between BMI and effect of CR is unclear. This study is to compare the effects of CR according to BMI with low EF patients after AMI.

Method: We retrospectively reviewed the medical records of the AMI patients who had done CR from 2018 to 2022. All patients underwent an exercise tolerance test (ETT) at about

P035 Table 1: Comparison of exercise capacity in exercise tolerance test

	Low BMI (n=31)			High BMI (n=37)		
	Initial	3 month	p-value	Initial	3 month	p-value
HRrest	71.1±10.1	70.8±15.8	0.394	76.2±13.0	72.3±10.1	0.019*
SBPrest	109.5±14.2	111.6±18.1	0.303	117.5±19.7	125.7±20.2	0.060
HRmax	146.8±18.9	149.5±16.3	0.349	147.5±31.2	152.3±18.0	0.413
SBPmax	154.6±24.3	167.2±30.3	0.003*	164.4±43.5	172.4±32.9	0.330
HRR	20.4±10.8	28.5±10.4	<0.001*	20.2±11.5	21.4±16.0	0.987
pVO2	30.1±9.5	38.4±10.4	<0.001*	36.2±12.9	38.5±14.0	0.046*
AT	21.9±6.9	23.3±6.0	0.043*	24.5±10.2	27.3±9.7	0.028*
METs	9.2±2.7	10.1±2.6	0.010*	10.7±3.5	12.6±8.1	0.074

P035 Table 2: Comparison of changes in exercise after cardiac rehabilitation

	Low BMI (n=31)	High BMI (n=37)	p-value
Δ HRrest	-0.3±15.1	-3.9±10.2	0.416
Δ SBPrest	2.1±14.1	8.1±23.3	0.375
Δ HRmax	2.7±14.8	1.4±12.5	0.820
Δ SBPmax	12.5±24.5	3.7±23.3	0.075
Δ HRR	8.1±8.3	1.4±15.0	<0.001*
Δ pVO2	8.2±4.5	2.2±8.1	<0.001*
Δ AT	0.9±5.3	1.9±6.8	0.684
Δ Peak METs	0.8±2.1	1.8±8.5	0.542

1 month and 3 months after AMI. Patients with EF below 50 were recruited. Patients were divided into 2 groups according to BMI, and those with above 25 were classified as high BMI group and below 25 as low BMI group. Depending on the initial ETT **Results**, patients performed home-based CR or center-based CR with detailed exercise regimen. After 3 months, follow up ETT was performed and outcomes were compared with initial ETT.

Results: 68 patients were enrolled in this study. 31 patients were in the low BMI group, and 37 patients were in the high BMI group. There were no significant differences between two groups in the baseline characteristics except BMI and body weight. After CR, both groups showed improvements in pVO_2 and anaerobic threshold. Low BMI group also showed improvement in heart rate recovery (HRR), metabolic equivalent tasks, maximal systolic blood pressure, and high BMI group in resting heart rate. After CR, the changes in measurements showed better outcome in low BMI group than high group in pVO_2 and HRR.

Conclusion: In AMI patients with low EF, CR improved functional capacity regardless of BMI. However, CR has greater effect in low BMI group on peak VO2 and HRR. Since there is a difference in the CR effect according to BMI, clinical emphasis is needed for individual patients.Fig. 1, Fig. 2

P036

Effects of diabetic polyneuropathy on functional outcome in diabetic transtibial amputees

J. Kim (Singapore/SG)

Background: Diabetic polyneuropathy is a common problem in people with diabetes. 85**%** of leg amputations were the result of a diabetic foot ulcer. Despite being a major complication, effects of diabetic polyneuropathy on functional outcome in amputees have not been well studied. The purpose of this study was to investigate the relationship between the severity of diabetic polyneuropathy and the functional outcomes for patients with diabetic transtibial amputation.

Method: Forty-three individuals with unilateral transtibial amputation and diabetic polyneuropathy were studied at a tertiary acute rehabilitation facility. Nerve conduction study was performed to evaluate the degree of polyneuropathy. Functional independence measure (FIM) motor score, FIM total score, and Amputee mobility predictor (AMP) score at admission and discharge were analyzed retrospectively.

Result: Discharge AMP score for severe diabetic polyneuropathy group was significantly lower than mild-to-moderate polyneuropathy group (P<0.05). There were no significant differences in admission and discharge FIM motor score, admission and discharge FIM total score, and admission AMP score between severe diabetic polyneuropathy group and mild-to-moderate diabetic polyneuropathy group.

Conclusion: Diabetic transtibial amputees with severe polyneuropathy had lower discharge AMP score. These findings suggest that severe diabetic polyneuropathy is considered as one of poor prognostic factors for function outcome after diabetic transtibial amputation.

P038

The multifaceted challenges of rehabilitation in limbic encephalitis: a case series

J. M. Yen (Singapore/SG), E. Chew (Singapore/SG)

Background: Limbic encephalitis often manifests with debilitating neurological deficits, causing significant disability and restriction in societal participation. Rehabilitation of these patients are often complex due their diverse impairments. Furthermore, neuropsychiatric sequalae varies widely among patients and hence rehabilitation needs are often dynamic. The rate of functional recovery in patients with encephalitis is reportedly slower when compared to patients with strokes or traumatic brain injury. However, little has been reported about the multifaceted challenges and rehabilitative interventions in limbic encephalitis.

Objectives: Primarily, we aim to describe the rehabilitation of patients with limbic encephalitis at various stages of their disease. Secondarily, we aim to document outcomes of rehabilitation and better understand the longitudinal health-related challenges faced in our local population.

Method: Retrospective review of medical records

Results: We discussed the complex and evolving challenges of rehabilitation in limbic encephalitis in 5 patients. All patients had motor impairments and cognitive deficits of varying severity, necessitating a combination of physical and cognitive therapy interventions. 3 of 5 patients experienced neuropsychiatric sequalae, which was associated in episodic decline in function in 2 of 3 patients. Impaired cognition was the main barrier to societal participation. Only 2 of 5 patients successfully returned to work or school with effective care coordination.

P039

Experience with the use of L-carnitine in the comprehensive outpatient rehabilitation program for patients with Long COVID

K. Ivantsov (Moscow/RU), V. Lim (Moscow/RU), I. Kukes (Moscow/RU)

Abstract: This study presents the **Results** of an investigation into the effectiveness of L-carnitine in the comprehensive rehabilitation program for patients with Long COVID, manifesting as asthenic syndrome, in an outpatient setting, based on the changes in clinical manifestations and metabolomic biomarkers over the observation period.

Objectives: To assess the effectiveness of L-carnitine when taken in courses with parenteral route of administration as part of a comprehensive rehabilitation program for patients with Long COVID, presenting as asthenic syndrome, in an outpatient setting.

Materials and Methods: A non-randomized controlled prospective study included 24 patients diagnosed with U09.9 "Post COVID-19 condition, unspecified", who were divided into 2 groups of 12 people each. Both the control and experimental groups underwent outpatient rehabilitation in the form of moderate aerobic exercise for 3 hours per week. The experimental group additionally received L-carnitine. Clinical assessment was conducted using scales (mMRC dyspnea scale; 6MWT 6-minute walk test; MFI-20 subjective asthenia assessment scale; Barthel scale for basic functional activity assessment) on the 1st day of the study, as well as on the

14-18th days of the study. Metabolomic screening, with the determination of amino acid levels in blood plasma using high-performance liquid chromatography and tandem mass spectrometry, and organic acids in urine using gas chromatography-mass spectrometry, was conducted on the 1st day of the study, as well as on the 14-18th days.

Results: The L-carnitine treatment group showed a more pronounced reduction in dyspnea manifestations compared to the control group (as assessed by the mMRC scale (p = 0.004), regression of asthenic syndrome manifestations (as assessed by the MFI-20 scale (p < 0.001), increased walking distance (as assessed by the 6MWT (p < 0.001), and improved daily functional activity (as assessed by the Barthel scale (p = 0.025). In the L-carnitine treatment group compared to the control group, there was an inhibition of catabolic processes (restoration of histidine levels, inhibition of isoleucine and proline growth), normalization of protein metabolism (stabilization of proline, reduction of oxalic acid levels), restoration of β-oxidation processes of fatty acids (reduction of methylsuccinic acid, improved cellular energy supply), reduced consumption of the body's natural antioxidant glutathione and coenzyme Q10 (reduction of cis-aconitic acid levels, elevation of coenzyme Q10 levels).

Conclusions: The use of L-carnitine in the comprehensive outpatient rehabilitation program for patients with Long COVID, manifesting as asthenic syndrome, helps to reduce dyspnea and asthenic syndrome manifestations, as well as improve daily functional activity and walking distance by enhancing β-oxidation processes, inhibiting catabolic processes, and reducing the burden on the antioxidant system.

P040

The need to share: creating a tailored support group for patients with Post COVID-19 condition in physical medicine and rehabilitation unit (the Epsilon programme)

H. Ardaillon (Lyon/FR), V. Gaucher-Piola (Lyon/FR), S. Jacquin-Courtois (Lyon/FR)

Background: Following the coronavirus pandemic in 2020, some patients with initial non-severe forms later develop a state of prolonged symptoms, coined Post Covid-19 Condition (PCC). Frequent manifestations include dysautonomia, fatigue, pain, and cognitive impairment. PCC is a common and debilitating condition in young adults, with a severe impact on work, family, and community life. Specific management and organisation of health care are still evolving. Primary care physicians can accurately treat patients with moderate symptoms.

In the Hospices Civils de Lyon, patients with severe or persistent PCC are first seen in an expert consultation (Epsilon consultation) for positive and differential diagnosis, assessment of functional impairment and appropriate symptomatic management. Interestingly, patients with PCC continued to report lacks in the current care pathway as they progressed through rehabilitation. Concerns that frequently emerged from these interviews were fatigue, pain, energy management, anxiety due to uncertainty, loss of work productivity, mood disorders, depression, loss of previous performance and loss of sense of inclusion or belonging.

Objectives: The need for peer support and sharing of experiences led us to create a tailored support group for PCC

patients in our Physical Medicine and Rehabilitation (PMR) unit.

Methods: The Epsilon programme was co-designed with patient partners. Consequently, in subsequent Epsilon consultations, the Epsilon programme was proposed in addition to previous management. Effects were assessed at baseline, at the end of the programme and after 3 months using validated functional status and quality of life scales.

Results: Later, a group of 8 patients was invited to the first Epsilon programme, which consisted of 6 workshops on 6 consecutive Fridays in March and April 2023. Spontaneous speech by the patients prevailed. Each workshop was dedicated to a specific theme, with appropriate speakers (doctors, physical therapists, occupational therapists, psychomotor therapists, adapted physical activity coaches, psychologists, nurses). The first workshop allowed for an exchange of experiences and scientific explanations on the multifactorial mechanisms of PCC, epidemiological data and continuing scientific questions. Subsequent workshops focused on somatic aspects, psychological aspects, resilience, and identity. A final workshop provided a synthesis of the proposals. Final feedback from patients on their participation allowed us to improve both content and modalities. The next two groups of the Epsilon programme are scheduled for June 2023 and September 2023.

Tailored support groups throughout rehabilitation could help patients with PCC to find their own solutions, reduce functional impairment and improve quality of life. The management and healthcare of these patients could be further improved.

P041

Does isokinetic lower limb muscle strengthening combined with focal spasticity treatment enhance fatigue, strength, and quality of life in multiple sclerosis patients?

H. Aboura (Sidi Bel Abbes/DZ), O. Bensaber (Sidi Bel Abbes/DZ)

Background: Several studies have demonstrated the benefit of isokinetic muscle strengthening (IMS) of the lower limbs on fatigue, strength and quality of life in multiple sclerosis (MS) patients.[1,2] However, no study has evaluated the effects of a program combining eccentric hamstring IMS and focal treatment of spasticity by intramuscular injection of botulinum toxin (BoNT) into the plantar flexors in MS patients with gait disorders.

Objective: The main aim of our study was to determine whether eccentric hamstring IMS combined with plantar flexor BoNT injections improved fatigue, strength, and quality of life in MS patients.

Design: This study was an open-label, uncontrolled study carried out in the Department of Physical Medicine and Rehabilitation of the Sidi Bel Abbès University Hospital, from June 2017 to January 2021.

Materials and Methods: Forty eight ambulatory spastic MS patients (26 women and 22 men, Expanded Disability Status Scale [EDSS] ≤ 6) completed a 12-session (3 times/week) program of eccentric hamstring strength deficit IMS 3 weeks after botulinum toxin injection using abobotulinumtoxinA (Dysport®.; 500 Speywood units) into spastic plantar flexors causing gait disorders with genu recurvatum that were identified by electrical stimulation. Quality of life (evaluated

using the SEP-59 questionnaire, fatigue severity (measured by the Visual Analogue Scale (VAS), and its impact by the French version of MS Fatigue Impact Scale (EMIF-SEP)), and isokinetic strength of the quadriceps and hamstrings (60°/s, 180°/s concentric, and 15°/s eccentric) were evaluated before and after the treatment program.

Results: Participants' mean age was 41.8 ±10 years (19; 62); median EDSS score: 4 (2; 6); mean time since diagnosis: 6.6±5.5 years (range: 0–22 years). The types of MS included were: relapsing-remitting (34 patients), primary progressive (7 patients), and secondary progressive (7 patients). Median Modified Ashworth Scale score was 3 (1+; 3), and the mean total dose of BoNT used per patient was 463.54 ±101.97 units. After the treatment program, spasticity decreased significantly (2.7 ± 0.6 to 0.5 ± 0.7, P<0.0001). A significant improvement in fatigue with a 34.45% reduction in VAS fatigue (P<0.0001) and a 28% decrease in EMIF-SEP (P<0.0001) were observed. Isokinetic muscle strength increased in the quadriceps and mainly deficient hamstrings at each speed, with better knee control during walking. Quality of life was also enhanced in eleven domains.

Conclusion: Our study showed that eccentric isokinetic hamstring strengthening combined with BoNT injections of the spastic plantar flexors in patients with MS is effective in improving fatigue, strength, and quality of life in these patients.

Keywords: Multiple sclerosis; Fatigue; Botulinum toxin; Isokinetic muscle strengthening; Quality of life; Spasticity

Disclosure: The authors have no conflicts of interest to declare.

P043

Association of respiratory muscle strength with trunk muscle strength and endurance in people with multiple sclerosis

M. S. Özen (Balikesir/TR), E. Özen (Balikesir/TR), C. Demir (Balikesir/TR)

İntroduction: Trunk stabilization is very important for the control of extremity movements. Stabilizing muscles include trunk muscles such as transversus abdominus, multifidus, diaphragm, and pelvic floor muscles. People with multiple sclerosis (pwMS) have weakness in trunk muscles. In addition, MS can cause weakness in respiratory muscles from early stages. Therefore, weakness in respiratory muscles can affect trunk stabilization.

Objectives: This study investigated the association of respiratory muscle strength with trunk muscle strength and endurance in pwMS.

Materials & Methods: Forty-six pwMS [mean age= 39.98±9.01 years, mean EDSS=3.09±1.16] were included. Respiratory muscle strength (maximal inspiratory pressure [MIP] and maximal expiratory pressure [MEP]) were measured using an oral pressure measuring device (COSMED Pony FX, Italy). The strength of the trunk muscles was evaluated by "Sit-ups" and Modified "Push-ups" tests, and endurance was evaluated by lateral bridge test (right-left), trunk flexion test, and "prone bridge" test.

Results: We detected a decrease of approximately 13% in MIP and 36% in MEP in the expected mean values of the patients. We found a positive correlation only between MIP and the "Sit-ups" test (r=0.313) and trunk flexors endurance test (r=0.474). There was a positive correlation of MEP with

"Sit-ups" test (r=0.459), modified "Push-ups" tests (r=0.568), lateral bridge test-right (r=0.483), lateral bridge test-left (r=0.503), the flexion test (r=0.425), and the "prone bridge" test (r=0.375).

Conclusion: The association of respiratory muscle strength with trunk muscle strength and endurance is very important for trunk stabilization in PwMS. For this reason, respiratory and trunk muscles should not be neglected in physiotherapy evaluations, and exercises to strengthen these muscles should be included in treatment programs.

P044

Influence of vestibular rehabilitation on balance and dual-task cost of walking in patients with multiple sclerosis: a randomized controlled trial

B. El-Nassag (Cairo/EG), A. Awad (Cairo/EG)

Background: Balance dysfunction and high dual-task costs are eminent features in multiple sclerosis (MS). Vestibular rehabilitation therapy (VRT) proved to promote functional outcomes; yet, its influence on dynamic balance and dual-task cost of walking (DTCW) in MS needs further research.

Objective: To investigate the effect of adding VRT to aerobic training on dynamic balance and DTCW in people with MS.

Methods: A Single blinded, parallel randomized controlled trial, was conducted in the out-patient Clinic at the Faculty of Physical Therapy and Kasr Al-Ainy Multiple Sclerosis Unit, Cairo University, Egypt. Forty patients with remitting-relapsing multiple sclerosis were randomized to a control (n= 20) and intervention (n= 20) groups. Over four successive weeks, all patients received stationary bicycle aerobic training, while the intervention group received an additional VRT program. Outcomes measures used were the Berg Balance Scale (BBS), walking speed tested by the 10 meters timed walk test (10 m-TWT), (DTCW), and overall stability index (SI).

Results: The intervention group showed a remarkable improvement in BBS (p =0.02), SI at levels four (p= 0.002) and seven (p= 0.03), and DTCW (p= 0.03) compared with the control group. Walking speed did not show significant changes post-treatment within or between groups comparison (P > 0.05).

Conclusion: Adding VRT to aerobic training has a positive effect on dynamic balance and the dual-task cost of walking in MS.

Keywords: Multiple sclerosis, vestibular rehabilitation, dynamic balance, dual-task cost of walking.

P045

Combination of intrathecal autologous bone marrow concentrate, neuromodulation and walking training stop disease and caused partial motor and systemic recovery in patient with multisystem atrophy (MSA-C)

J. Bodziony (Lucerne/CH)

Multiple System atrophy (MSA) is a neurodegenerative disease with disorder of autonomous functions (cardiovascular and/or urine bladder), with parkinsonism, cerebellar symptoms and cortico-spinal signs. The stem cell therapy is a interesting option for therapy of this disease (1,2,3).

We reported about 56 years old female patient, which 2018 demonstrated progressive gait disorder and some months later speech disorder. In addition, a disturbance of the ability to concentrate had occurred. Diagnostic 2018: walking and writing restricted, cerebellar syndrome with atactic gait, oculomotor disorder, dysarthria, heel knee test left and finger-nose test right atactic, mild bradykinetic movement disorder in the tapping tests, speech disorder and concentration disorder, PET-MRI: The postersior left emphasized asymmetric cerebellar hypometabolism spoke against the presence of spinocerebellar ataxia (SCA) and is well compatible with MSA-C in conjunction with the clinical data (including speech disorder). Schellong test, pupillography, sympathetic skin reflex normal, somatosensory evoked potential (N. medianus) pathological, cerebrospinal fluid unobtrusive including onconeural antibodies. SCA genetic clarification carried out by means of next-generation sequencing was inconspicuous. Clinically and due to the negative genetic **Results**, multisystem atrophy of the cerebellar type was diagnosed. She received four years intensive rehabilitation therapy but continue worsening. We see her first time at the end of 2021. She could not walk alone, could not speak, and was 100**%** dependent from help in daily life. She received in our NeuroRehabClinic a combination of intrathecal autologous BMC (bone marrow concentrate) with about 10**%** stem cells) + movement therapy + neuromodulation as previously described. After one week she could alone walk and speaking was massively improved. Oculomotor disorder (double seeing) improved with prism glasses. This improvements is stable already 12 months with daily walk training and speech training.

References

1. Singer, W. et al. (2019) Intrathecal administration of autologous mesenchymal stem cells in multiple system atrophy. Neurology 93, e77 – e87
2. Chang, C. et al. (2020)Transplantation of Adipose-Derived Stem Cells Alleviates Striatal Degeneration in a Transgenic Mouse Model for Multiple System Atrophy. Cell Transplant 29, Volume 11: 1 – 13
3. Park, K.-R. et al. (2020). Prevention of multiple system atrophy using human bone marrow-derived mesenchymal stem cells by reducing polyamine and cholesterol-induced neural damages. Stem Cell Res Ther 11, 63

P046

Rehabilitation of a patient with neuomyelitis optica spectrum disorder: a case report

W. L. Lui (Singapore/SG), Z. Y. V. Ng (Singapore/SG), W. L. W. Chan (Singapore/SG)

A 32 year-old lady presented with a 1 day history lower limb weakness, inability to walk and progressive numbness over her chest and her lower limbs. On examination, her power in her lower limbs were 0–1 on the Medical Research Council (MRC) scale. She had reduced sensation below T2. She had no cranial nerve deficits and her reflexes were intact. Magnetic resonance imaging (MRI) of the brain showed focal signal changes without enhancement in the inferiomedial thalamic region adjacent to the third ventricle bilaterally and MRI of the cervical and thoracic spine revealed multiple long segment areas of signal abnormality with mild enhancement. Antibodies to aquaporin-4 was also present. She was diagnosed with Neuomyelitis Optica Spectrum Disorders (NMOSD) and was treated with plasma exchange, rituximab and steroids.

She was subsequently transferred to a rehabilitation centre for inpatient tertiary rehabilitation.

On admission, her neurological level of injury (NLI) was T4 and American Spinal Cord Injury Association Impairment Scale (AIS) was C. Her lower extremity motor score (LEMS) was 18. She required assistance in activities of daily living (ADL) except for feeding. She required an indwelling catheter and rectal stimulants for bowel management. She underwent strength, balance and endurance training and subsequently progressed to ambulation training.

On discharge 7 weeks later, she had improved neurologically to L2 AIS D. Her LEMS was 46. She was weaned off the catheter and did not have any symptoms of lower urinary tract dysfunction. She was independence in activities of daily living and was community ambulant without aid with a gait speed of 1.36 metre per second. Her Functional Independence Measure (FIM) score improved from 71 to 125 on discharge.

At 5 months after her initial presentation, she regained full strength in her lower limbs and returned to work and even exercise.

This case highlights the importance of intensive rehabilitation management in this patient with NMOSD.

P047

Fall and predictors of fall self-efficacy in patients with neurologic diseases in Kano Metropolis, Nigeria

J. Usman (Kano/NG), A. Kabir (Kano/NG)

Introduction: Fall is a key health concern among individuals with neurologic diseases, efforts and emphasis should be geared toward studying it and its predictors.

Objectives: To determine the prevalence and pattern of fall as well as predictors of fall self-efficacy among neurologic disease patients in Kano metropolis, Nigeria.

Materials & Methods: A total of 111 neurologic disease patients recruited using purposive sampling technique from two selected Hospitals in Kano Metropolis. Nigeria participated in the cross-sectional survey. A proforma was used to obtain information about socio-demographic, clinical characteristics, as well as fall and fall related information of the participants. Fall efficacy scale was used to measure the participant's fear of fall and Mini Mental Scale Examination was used to evaluate their level of cognitive function. Data obtained was analyzed using descriptive statistics, and inferential statistics in form of Chi- square for association, Mann Whitney U test for between group differences and multiple regression analysis for prediction of fall self-efficacy. Statistical package for Social Sciences was used for the analysis, and significance was set at $p \leq 0.05$.

Results: Majority of the participants 49 (44.1**%**) fall between 5–70 years of age, male participants constitute 52.3**%** of the participants. The highest and the least form of neurologic diseases were stroke (65.8**%**) and muscular dystrophy (0.9**%**) respectively. Prevalence of fall was found to be 72.97**%**, most of the participants (73**%**) reported history of fall with few of them (11.7**%**) having fear of fall while majority (88.3**%**) have no fear of fall. Many participants (51.4**%**) reported frequency of fall episodes to be five times or less per year, with weakness (21.6**%**) and slipping (16.2**%**) reported as the leading causes of the fall. Bruising (36.9**%**) was the reported as the major consequence following fall with participants reporting the time of fall occurrence to be anytime with night having slightly higher percentage (19.8**%**). Although, no significant difference (P>0.05) in fall self-efficacy was found

between fallers and non-fallers, also no significant association (P>0.05) between some socio-demographic characteristics and prevalence of fall was found, however, cognitive status and age have been found to significantly (P<0.05) predict fall self-efficacy among the study participants.

Conclusion: It can be concluded that prevalence of fall is high while that of fear of falling is low. Some socio-demographic characteristics were not associated with prevalence of fall. Age and cognitive status significantly predict fall self-efficacy. It is recommended that Physiotherapists, other health care professionals and family members should pay close attention to fall and fall self-efficacy especially in individuals with neurologic diseases especially be particularly those of advanced age, also cognitive status of such individuals should be monitored regularly.

P048

Exploring the relationship between constipation, pain, and physical inactivity in Parkinson's disease: implications for clinical management

M. Al-Wardat (Irbid/JO)

Introduction: Parkinson's disease (PD) is a neurodegenerative disease that affects both motor and non-motor functions, including constipation and pain. Indeed, the pathophysiological causes of constipation and pain in PD are multifactorial and significantly affect the quality of life. However, the relationship between constipation, pain, and physical inactivity in PD patients is not clear.

Objectives: This study aimed to investigate the relationship between constipation, pain, and physical inactivity in a cohort of PD patients.

Materials & Methods: The study involved 67 PD patients, with 32 patients having constipation (PDwC) and 35 patients without constipation (PDwoC). Pain characteristics were assessed using both the Kings Parkinson's Pain Scale (KPPS) and the brief pain inventory (BPI). Physical activity levels were determined using the International Physical Activity Questionnaire short form (IPAQ). All participants completed demographic and clinical assessments using the non-motor symptom scale (NMSS) and the Movement Disorder Society Unified Parkinson's Disease Rating Scale (MDS-UPDRS) Part III.

Results: The study found that PDwC patients had significantly higher scores on certain aspects of pain, as well as higher pain severity and interference, compared to PDwoC patients. The study also found that PDwC patients had worse non-motor symptoms, including fatigue, daytime sleepiness, depression, and sleep disorders. Furthermore, PDwC patients were less physically active than PDwoC patients, suggesting a complex relationship between constipation, pain, and physical activity.

Conclusion: The study highlights the importance of addressing and managing constipation as a potential factor in managing pain in PD patients. By addressing constipation, healthcare providers can potentially improve pain management and the overall well-being of PD patients. However, more research is needed to fully understand the relationship between these factors and how to manage them in PD patients with constipation.

P049

Does hand deformity affect manual and finger dexterity in patients with parkinson's disease?

Ş. Keçelioğlu (Balikesir/TR), A. Dogan (Balikesir/TR), M. S. Özen (Balikesir/TR), F. N. Yılmaz (Balikesir/TR), G. Yılmaz Gökmen (Balikesir/TR)

İntroduction: Dexterity is important for performing daily and functional activities in different stages of Parkinson's disease, and patients are often faced with the loss of dexterity. It is known that patients have difficulty in manipulating objects and there is a decrease in manual and finger dexterity. On the other hand, striatal hand deformity and Parkinson's disease-related hand deformities can be seen in patients with Parkinson's disease, and this affects the anatomy of the hand. Therefore, in addition to the loss of manual and finger dexterity, accompanying hand deformity may also create a disadvantage.

Objectives: To investigate whether hand deformity affects manual and finger dexterity in patients with Parkinson's disease.

Materials & Methods: A total of 22 right-handed patients with (n=11) and without (n=11) hand deformity were included in this study. We evaluated manual dexterity with the Minnesota Manual Dexterity Test and finger dexterity with the 9-Hole Peg Test.

Results: The mean age (year) of the patients was 67.41±9.68 and the disease duration (year) was 2.75±1.64. The classification of the patients according to Hoehn & Yahr was stage 1 (n=12) and stage 2 (n=10). The patients had different hand deformities such as boutonniere, swan neck, MCP joint flexion, PIP joint hyperextension in the index, middle, and ring fingers, z-thumb deformity, and ulnar deviation of fingers. Deformities were seen on the right (n=4), left (n=1), or both (n=6) hands. There were no differences between the patients with and without hand deformity in terms of manual dexterity and finger dexterity (p>0.05).

Conclusion: In our study, there were no differences in the manual and finger dexterity of the patients according to the presence of hand deformity, which may be due to the fact that the patients were at early stages according to Hoehn & Yahr and the duration of the disease was short. On the other hand, the heterogeneous group of patients in terms of hand deformities in our study may also have affected the **Results**. In the future, studies can be designed in which dexterity is evaluated according to the stages and duration of the disease, and the severity and clinical characteristics of hand deformities.

P050

PWR! Moves integrated in a physiotherapy protocol for functional mobility in a patient with vascular parkinsonism: a case study

C. Pereira (Alcabideche/PT), F. Ferreira (Lisboa/PT, Alcabideche/PT), H. Santos (Cascais/PT, Alcabideche/PT)

Introduction: Vascular Parkinsonism is a disease in which the onset of symptoms, contrary to Idiopathic Parkinson's Disease, is of vascular origin. It encompasses a set of signs and symptoms in which the predominant syndrome is parkinsonism - predominantly bradykinesia in the lower limbs, rigidity, postural instability, freezing and festination of gait,

absence of resting tremor or poor response to dopamine, and presence of corticospinal dysfunction. Parkinsonism can have repercussions on patients' functional mobility. **Objective:** To describe an intervention protocol for functional mobility that integrated PWR! Moves® for bed mobility and sit-to-stand issues in a patient with Vascular Parkinsonism and to analyze the data obtained after 15 intervention sessions. Case Description: A 79-year-old male patient diagnosed with Vascular Parkinsonism since 2019. He had difficulty with bed mobility, sit-to-stand, especially getting in and out of the car, and difficulties with gait, using a Nordic walking stick for ambulation.

Results: Not all results were positive; however, the most significant improvements were observed in bed mobility and gait. By the end of the program, the patient was able to perform changes in bed position more smoothly and engage in gait with greater functionality and autonomy.

Conclusion: It was possible to implement the intervention protocol that integrated the PWR! Moves® approach, and after 15 intervention sessions, improvements were observed in bed mobility and gait. Given the inherent limitations of this type of study, further research is needed to verify the effectiveness of this type of intervention.

P051

Rehabilitation with slow movement training in patient with post-hypoxic myoclonus: a case report

H. S. Jo (Gwangju City/KR), M. K. Song (Gwangju City/KR), J. Y. Han (Gwangju City/KR), H. K. Park (Gwangju City/KR), I. S. Choi (Gwangju City/KR)

Objective: Due to lack of cases, there is no clear guideline for rehabilitation of post-hypoxic myoclonus. Lance-Adams syndrome (LAS) refers to action myoclonus that starts days to weeks after cardiopulmonary resuscitation. Rehabilitation brings better functional recovery for patients after hypoxic event, however, myoclonus can disturb patient's intended movement and affects physical, psychological and emotional status. Furthermore, because myoclonus interferes therapeutic exercise which promotes functional gain, we need to control myoclonus. We report our experience anti-myoclonic agent adjustment and rehabilitation with slow movement training for handling the action myoclonus led the patient with LAS to functional improvement.

Case description: A 51-year-old woman arrived at our emergency department in a coma. She was in cardiac arrest after wrist shortening operation at other medical center. On day 24 of hospitalization, she transferred to rehabilitation ward and neurological examination was performed. Her mental status was drowsy and she had motor weakness in all extremities. Action myoclonus which means involuntary muscle contraction during voluntary movement was observed. Active rehabilitation programs were applied, including active assistive range of motion exercise, mobility training, activities of daily living (ADL) training and gross and fine motor coordination. Patient received 30 minutes per session, 10 sessions a week, over 8 weeks. During active rehabilitation, action myoclonus was seen more often. EEG showed right frontal dominant theta slow waves without epileptiform discharges and brain single photon emission computed tomography (SPECT) demonstrated slight decrease of perfusion in right frontal lobe and left temporal lobe. Considering the test

Results: We diagnosed these myoclonus as LAS. With using conventional medication to control myoclonus, clonazepam (1mg) and levetiracetam (2000mg) per oral daily, action myoclonus was reduced, but still remained. Then we added perampanel (selective non-competitive antagonist of α-amino-3-hydroxy-5-methyl-4-isoxazolepropionic acid receptor). To control myoclonus more, we adopted slow movement rehabilitation which means moving below the threshold of myoclonus to reduce myoclonus and control patient's intended movement. After 3 months from initial assessment, she adapted to her myoclonus and showed enhancement of muscle strength and ADL performance **(Table 1)**. With overall improvement, she was transferred to other rehabilitation center for ongoing rehabilitation **(Fig. 1)**.

Conclusion: We report case of rehabilitation for LAS. Through comprehensive rehabilitation with personalized medication therapy and tailored rehabilitation strategy, there was noteworthy improvement in the patient's myoclonus and functional outcome.

Key Words: Lance-Adams syndrome, action myoclonus, hypoxic brain injury, rehabilitation

P051 Table 1: Functional assessment

	After transfer to rehab ward	After 1 month	After 3 months
MMT (Rt. U/E / Lt. U/E)			
Shoulder	(3-/3-)	(3+/3-)	(3+/3-)
Elbow	(3-/3-)	(3+/3)	(3+/3+)
Wrist	(3-/3-)	(3+/3+)	(3+/3+)
MMT (Rt. L/E / Lt. L/E)			
Hip	(3-/3-)	(3/3)	(3+/3+)
Knee	(3-/3-)	(3+/3+)	(4/4)
Ankle	(3-/3-)	(3/3)	(4/4)
Great toe	(3-/3-)	(3/3)	(4/4)
K-BBS	1	3	27
K-MBI	0	21	39
K-MMSE	24	24	29
FAC	0	1	2
	(Bed-ridden)	(Wheelchair ambulation with maximal assist)	(Walker ambulation with maximal assist)

Abbreviations : MMT, manual muscle test; K-BBS, berg balance scale to Korean version; K-MBI, modified barthel index to Korean version; K-MMSE, mini-mental state exam to Korean version; FAC, functional ambulation categories; U/E, upper extremity; L/E, lower extremity
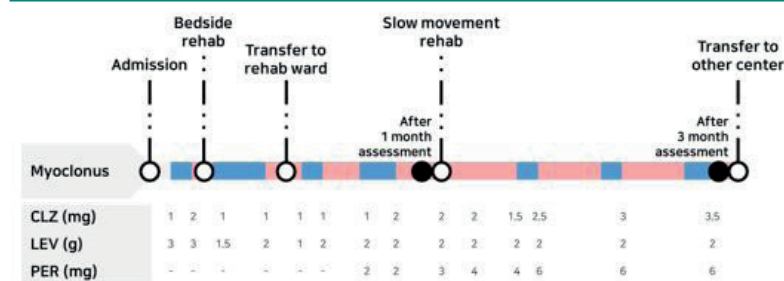
P051 Fig. 1. Time table shows the improvement of myoclonus and daily dose of medication. Read color means patient's subjecitve improvement of myoclonus, and blue color means worsening of symptom. CLZ: clonazepam, LEV: levetirazetam, PER: perampanel

P052

Retroperitoneal compartment syndromes with neurological deficits

S. Adiga (Auckland/NZ)

With increasing use of anti-platelet & anticoagulant medications, retroperitoneal bleeding into Psoas & Iliacus musculofascial compartments is expected to rise. There is paucity of literature in this field, limited to case reports & a few case series; these often focus on one or two select issues of interest only. Many important issues are not understood – for

instance, the whole lumbar plexus is located inside Psoas major muscle and any bleed into these tight Musculo-fascial compartment syndrome results in compartment syndrome, with high likelihood of nerve palsy and need urgent decompression with open fasciotomy wherever possible. Serious risks to the nerve plexus of insertion & removal of percutaneous drains is not recognised. Imprecise terminology like "ilio-psoas" and "lumbo-sacral" "radiculo-neuro-plexopathy" clouds the scene further, making documentation & communication difficult. When this happens in a stroke patient with pre-existing neurological deficit, recognition, diagnosis & management becomes even more difficult.

The present work involves literature review with focus on identification, prevention & management of the neurological deficits – medical, surgical & rehab aspects.

Results from this review show that there are only 2 reports identifying this condition as a nerve saving emergency (compartment syndrome). There is only one report on this happening against the backdrop of a stroke – a case of cerebral venous thrombosis; no other reports associated with more common varities of ischaemic & haemorrhagic strokes. There is very little coverage of the rehabilitation aspects; only one report of salvage surgery.

Our experience with stroke and non-stroke cases will be presented and our views on acute & rehab management is shared.

It is expected that this work will lead to increased awareness among the clinicians about this emergency situation and lead to early recognition & appropriate management.

It is hoped that the importance of use of precise terminology like "Psoas compartment syndrome secondary to coagulopathy, resulting in complete lumbar plexus palsy" will be understood & followed in clinical communication & research.

Importance of managing these emergencies appropriately, even in stroke cases with pre-existing deficits is emphasized. This is because conversion from UMN (upper motor neuron) palsy to LNM (Lower Motor Neuron) palsy will often result in further functional worsening – loss of automatic stance helping in transfers for instance.

A few additional tips are given on rehabilitation, timing of NCS (nerve conduction studies) and salvage surgery. These are expected to help the rehab clinicians dealing with this rare injury with limited evidence base.
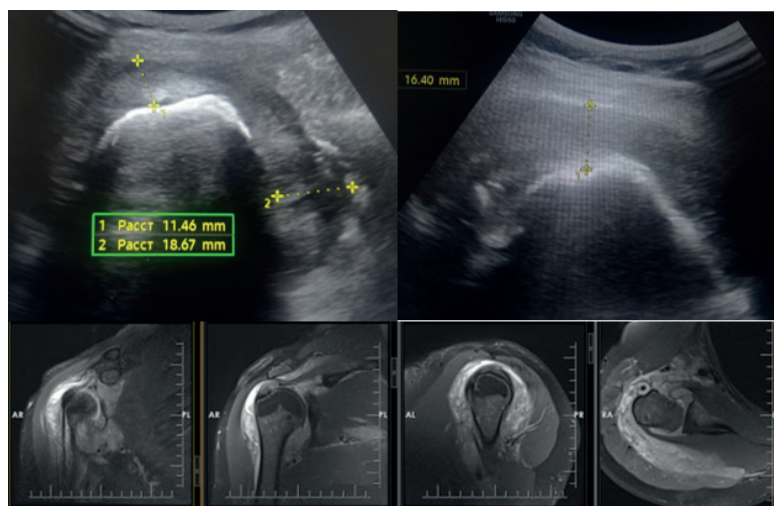
P053

Imaging evaluation for shoulder soft tissue sarcoma: the significance of ultrasound in diagnosis and management

R. Bubnov (Kyiv/UA), L. Kalika (New York, NY/US), G. Pilecki (Zabrze/PL), Z. Pilecki (Zabrze/PL)

Introduction: Chronic pain is a prevalent condition with various underlying causes that pain specialists strive to understand and address effectively. Ultrasound imaging provides detailed visualization of soft tissues, including muscles, tendons, and ligaments, which may not be as clearly visible on CT or MRI scans. This capability proves particularly useful in cases where soft tissue abnormalities or injuries are suspected, such as chronic pain or musculoskeletal disorders.

Case report: A case presentation within the report describes a 51-year-old female patient with severe pain and restricted shoulder movements. Physical examination revealed a pal-

P053 Fig. 1. Time table shows the improvement of myoclonus and daily dose of medication. Read color means patient's subjecitve improvement of myoclonus, and blue color means worsening of symptom. CLZ: clonazepam, LEV: levetirazetam, PER: perampanel

pable soft tissue mass in axillary with skin overlying skin changes and suspected lymphadenopathy.

Musculoskeletal ultrasound was performed, and a well-circumscribed, hypoechoic mass was identified in the subcutaneous tissue of the right shoulder. Sensitive Doppler imaging revealed increased vascularity within the mass, with arterial flow noted on spectral Doppler. Ultrasound examination revealed soft tissue tumors surrounding the right shoulder joint, extending to the proximal parts of the humerus, with predominant involvement of synovial surfaces, muscles, fascia, subcutaneous tissue, skin, and scar tissue.

Range of motion in the affected shoulder was limited to 20 degrees due to pain, signs of shoulder impingement by tumor and considerably limited due to involvement of the long head of the biceps tendon, as well as other tendons evident on functional US.

Based on the ultrasound findings, the mass was suspicious for a soft tissue sarcoma. Further workup, including MRI and CT scans, confirmed the presence of a solid, enhancing mass in the subcutaneous tissue of the right shoulder, measuring 4 cm x 3 cm x 2 cm in size.

CT and MRI findings: A CT scan and MRI of the left shoulder were performed, showing a soft tissue mass with similar features as the ultrasound findings. The CT scan demonstrated no evidence of bony involvement, while the MRI revealed a heterogeneous mass with low signal intensity on T1-weighted images and high signal intensity on T2-weighted images. An open biopsy was performed, and a synovial sarcoma was diagnosed, patient underwent radiation therapy.

Conclusion: The report highlights the possibility that pain could be caused by a particular condition, and emphasizes the importance of using ultrasound for initial diagnosis, expert evaluation, and monitoring outcomes. We discuss the potential dangers of treating such conditions with physiotherapy and emphasize the need for greater awareness among healthcare professionals. Overall, this report aims to raise awareness of soft tissue tumours as a cause of chronic pain and promote better management through the use of ultrasound for diagnosis and monitoring.

P054

Effect of robot-assisted gait training frequency on independency and lower extremity function in adults with chronic spinal cord injury

A. Mänd (Haapsalu/EE)

Objectives: The aim of the study was to find out how different frequency of robot-assisted gait training (RAGT) on Lokomat affects functional independence and lower extremity functional measurements of adults with chronic spinal cord injury (SCI)

Methods: A total of 12 adults, age 24–60, with chronic SCI were included in this study. Study subjects were divided into two groups: one group recieved 8 Lokomat trainings in 10 day period (experimental group – EG) and the other group recieved 4 Lokomat trainings (control group – CG). At the beginning and end of the treatment period lower extremity measurements – spasticity (L-Stiff) and strength (L-Force) were measured using Lokomat hardware and software and Functional Indepence Measure (FIM) was conducted at the beginning and end of treatment period.

Results: In EG there was increased spasticity in left and right hip flexors with faster speed (45°/s and 90°/s) and in left hip extensors with faster speed but with slower speed (22,5°/s) and in right hip extensors spasticity decreased. Spasticity also increased in EG in left and right knee flexors and extensors. EG results in spasticity were not statistically significant. In EG muscle strength increased in left hip flexors and extensors and decreased in right hip flexors and extensors (decrease in hip extensors p<0,05) and increased in left and right knee flexors and extensors. Improvements in muscle strength in EG were not statistically significant. In CG spasticity decreased in left and right hip and knee flexors and extensors. Decrease was statistically significant for only right knee extensors with speed 30°/s (p<0,05). In CG muscle strength increased in all muscle groups but increase was statistically significant only for left knee extensors (p<0,05). FIM score increased in EG on one subject, but considering the group mean it was not statistically significant. In CG there were no changes in FIM score.

Conclusions: RAGT has some positive effect on lower extremity functional measurements but does not influence functional independence. Lower frequency training has some positive effects on decreasing spasticity and increasing muscle strength. Higher frequency training had more increase in spasticity but also had increase in muscle strength in the same muscle groups, but results were not statistically significant.

P054 Fig. 1. Hip flexors and extensors strength on first and last evaluation in experimental group (EG) and control group (CG). HLF: hip left flexion, HRF: hip right flexion, HLE: hip left extension, HRE: hip right extension. * p<0.05

P054 Fig. 2. Knee flexors and extensors strength on first and last evaluation in experimental group (EG) and control group (CG). KLF: knee left flexion, KRF: knee right flexion, KLE: knee left extension, KRE: knee right extension. * p<0.05

P055

What improvement after toxin and constraint induced therapy in the spastic hemiplegic upper limb?

S. Ammor (Sidi Bel Abbes/DZ), O. Bensaber (Sidi Bel Abbes/DZ)

Introduction: Stroke is currently a major public health issue, on the one hand by its incidence which has continued to increase in recent years, and on the other hand by the neurological deficit induced in particular in the spastic upper limb which alters the quality of life of patients. 2/3 do not recover a functional limb (Bensmail 2022). Induced constraint therapy is an innovative means of rehabilitation to combat the phenomenon of acquired non-use.

Objectives: To compare the combination of induced constraint therapy and toxin with functional rehabilitation and toxin in the improvement of the spastic hemiplegic upper limb and its integration into daily activities.
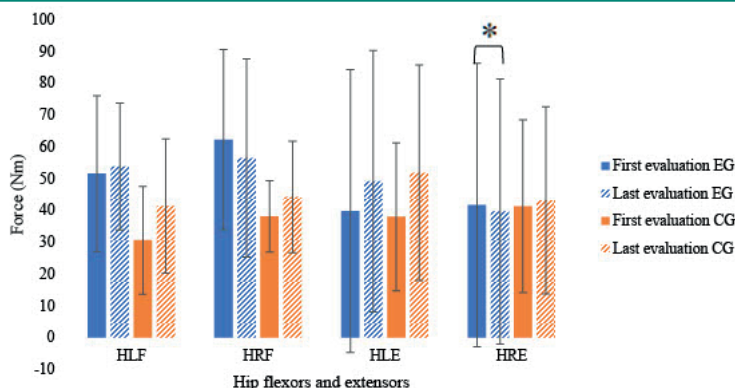
Materials & Methods: The study involved 46 hemiplegic patients with a spastic upper limb and residual motricity of 2 or more at the level of the wrist and the hand, toxined according to a functional purpose, and 4 weeks later, divided into 2 groups, one subjected to induced constraint therapy 02 hours of intensive work over 4 hours of constraint 5 days a week, and the other to conventional rehabilitation 01 hour of work, 5 days a week for 4 weeks.

All patients were assessed by MAS and MAL Motor Activity Log (amount of use and quality of movement) and VAS satisfaction before and after treatment.

Results: The mean age in the two groups was 55.67 ± 12 (TCI group) and 59.46 ± 13 (RC group), the stroke was ischemic in 80% of the cases, the finger flexors were toxined in all patients, elbow, palmar and interosseous flexors depending on the desired goal.

The intra-group analysis revealed a significant improvement for both tests with a P<10-3 in both groups.

The comparative analysis between the two groups did not show any significance for MAS, on the other hand a better integration of the upper limb in the TCI group with a P=0.042 for the amount of use and p=0.047 for the quality of movement.
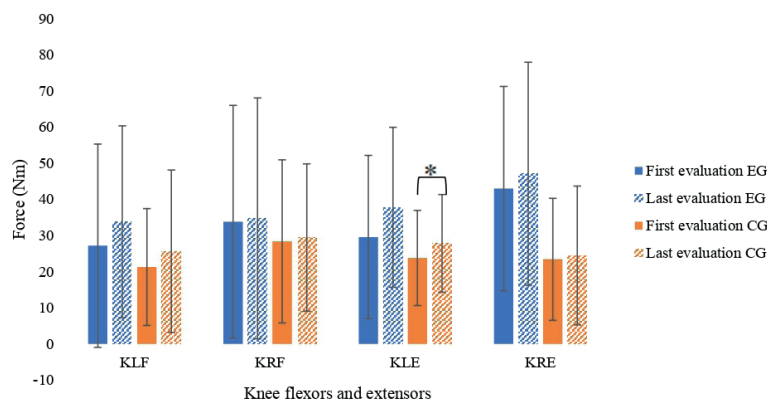
VAS satisfaction exceeded 75**%** in the TCI group and 55**%** in the RC group.

Conclusion: The neurological deficit caused by the occurrence of a stroke, added to the spasticity and the non-use acquired, results in a major handicap, particularly for the upper limb. cerebral plasticity can be developed by intensive work and repeated tasks included in restraint-induced therapy which appears to improve the limb's integration into daily activities.

P056

Albertov day therapy center program of intensive cognitive rehabilitation in acquired brain injury survivors

S. Klimosova (Prague/CZ), M. Krivosikova (Prague/CZ), M. Cihak (Prague/CZ), Y. Angerova (Prague/CZ)

Cognitive deficit is a substantial part of neurological consequences of acquired brain injury (ABI) and becomes a significant therapeutic target in complex rehabilitation of ABI. Albertov day therapy center (DTC) provides intensive complex rehabilitation in ABI on outpatient basis for over 20 years. DTC target population are patients discharged from inpatient rehabilitation and adapting to their home environment. In 2020 new program of cognitive rehabilitation was created for patients with cognitive function deficit as their most prominent problem, with sufficiently preserved communication skills and mobility.

From October 2020 to January 2023 26 patients finished the program, 14 females, 12 males, aged 18–77, mean age 46 years. Most frequent cause of ABI was ischemic stroke (10), traumatic head injury (9) and hypoxic-ischemic post-resuscitation encefalopathy (3). Time interval form ABI to beginning of DTC program was 3-24 month. Individual cognitive training once a week was administered in most patients on average for 6 months prior to intensive 4 week daily program, allowing to evaluate severity of cognitive deficit, motivation, compliance and fatiguability of the patient.

DTC standard multidisciplinary and interdisciplinary approach is based on physiotherapy and occupational therapy together with speech therapy, artetherapy and neuropsychological intervention as needed. In cognitive rehabilitation program neuropsychologist and occupational therapist head the treatment plan together with speech therapy and special education specialist. Physiotherapy is focused on motor-cognitive interference training, dynamic stability and general physical condition improvement. Treatment goals are formulated in advance and evaluated 2 weeks after the program. Goal Attainment Scale is used for quantification of results achieved together with standard tests specific for each discipline. Follow-up of the patient is long-term, with re-evaluation of cognitive function 6 and 12 months after DTC program.

Preliminary data demonstrate positive efect of intensive cognitive rehabilitation in the form of DTC program and sustainability of the efect over follow-up period in most patients. Day therapy center outpatient rehabilitation program represents feasible form of treatment for cognitive deficits in patients after acquired brain injury.

P057

Neurorehabilitation in patients with stroke – first-ever time versus recurrent

D. Maslarov (Sofia/BG), D. Drenska (Sofia/BG), J. Maslarova-Gelov (Sofia/BG), I. Gelov (Sofia/BG)

Introduction: In Bulgaria 82 398 new cases of cerebrovascular disease are registered yearly, and 40 000 of them are stroke patients (National Consensus on Prevention, Diagnosis and Treatment of Cerebrovascular diseases, 2020). Recurrent ischemic stroke is associated with an increased rate of disability and mortality. These patients also have a higher dependency in basic and instrumental activities of daily living (ADLs).

Objectives: Our study investigated the impact of different types of stroke – first-ever time and recurrent on functional recovery during a 6 month-period to aid in individualized decision-making at neurorehabilitation algorithms.

Materials and

Methods: 30 patients with first-ever time and 30 with recurrent ischemic stroke underwent clinical assessments, cognitive testing and a neurorehabilitation program. Outcomes were evaluated at discharge, 3 and 6 months by the NIH Stroke Scale (NIHSS) and the Barthel Index (BI). The results were obtained by ANOVA with post-hoc Tukey HSD test, $p < 0.01$.

Results: In the group with recurrent stroke, patients were older [mean age 74.63 (±5.12) years vs 69.63 (±6.34)], at discharge they have a more severe residual deficit [NIHSS 12.27 (±3.78) vs 10.4 (±5.60); BI 53.17 (±16.21) vs 59.33 (±22.43)] and a frequency of cognitive impairments was higher 66.67**%** vs 30.0**%**. During the follow-up period, there was a significant improvement in first-ever stroke subjects between the time of discharge and month 3, and the recovery index was lower from months 3 to 6 (NIHSS: HSD [.05]=0.55; HSD [.01]=0.7; BI: HSD [.05]=2.92; HSD [.01]=3.67). An improvement in patients with recurrent stroke has a positive correlation to time and was more marked at month 6 (NIHSS: HSD [.05]=0.38; HSD [.01]=0.48; BI: HSD [.05]=1.82; HSD [.01]=2.3).

Conclusion: Patients with recurrent stroke tended to have an extended rehabilitation process. In most cases it applies to older adults with multiple comorbidities and cognitive impairments. Both goal-oriented and differentiated assignments were included in the neurorehabilitation programs. The results showed that this approach is one of the main reasons for their efficacy and effectiveness.

P058

Effect of modified shoe with motor relearning programme on timed up and go test values and gait parameters in chronic stroke patients: comparative study

S. Sundar (Dindigul/IN)

Background: Hemiplegia secondary to stroke contributes to problems associated with standing and walking. Hemiplegic patients suffer from poor balance, slow walking, and weak muscles. Shoe modification and foot orthoses can play an important role in the nonsurgical management of foot and ankle pathology. Therapeutic footwear may be used to treat patients with diabetes, arthritis, neurologic conditions, traumatic injuries, congenital deformities, and sports-related

P058 Table 1. Comparison of pre intervention values of mean, SD and p value between control and experimental group with student t test (Source: Author)

No of Subjects	Variables	Control Group (Spencer Technique) Mean ± SD	Experimental Group (Myofascial Release) Mean ± SD	P value
20	Timed Up and Go Test values	22.0 ± 6.89	22.5 ± 2.5	0.6121
	Step length	24.54 ± 13.37	25.24 ± 12.74	0.5782
	Cadence	35.65 ± 23.12	36.40 ± 16.48	0.6342

P058 Table 2: Comparison of post intervention values of mean, SD and p value between control and experimental group with student t test (Source: Author)

No of Subjects	Variables	Control Group (Spencer Technique) Mean ± SD	Experimental Group (Myofascial Release) Mean ± SD	P value
20	Timed Up and Go Test values	18.7 ± 5.34	16.4 ± 0.93	0.0095
	Step length	30.0 ± 26.47	35.0 ± 18.82	0.0043
	Cadence	40.2 ± 22.86	48.0 ± 22.47	0.0032

injuries. These modalities may improve patient gait and increase the level of ambulation.

Aims and Objectives of the study: To analyse the effect of modified shoe with motor relearning programme on Timed Up and Go test values and gait parameters of chronic stroke patients.

Data Analysis and Results: Pre intervention values of Timed Up and Go test (TUG) and gait parameters were homogenous between control and experimental groups with p≥0.05 and post intervention values of TUG and gait parameters were statistically significant improvement in experimental group where shoe modification with motor relearning program with p≤0.05

Conclusion: It was concluded that Modified Shoe with Motor Relearning Programme had statistically significant improvement in the Timed Up and Go test values and gait parameters of chronic stroke patients when compared to motor relearning program alone.

Keywords: Chronic Stroke, Motor Relearning Program, Timed Up and Go Test, Gait Parameters.

P059

Gloreha and Action Observation Therapy (AOT): new approaches in neurorehabilitation

E. Morcillo de Mercado (Madrid/ES), *G. Gonzalez Jimenez* (Madrid/ES)

Background: The aim of this study was to explore the effects of robot-assisted motion "Gloreha" and action observation therapy in the recovery of a patient after a stroke.

Methods: The study of a single case of a 22-year-old subject, with a left hemiparesis of hypotonic predominance after multiple ischemic strokes. The intervention was training by AOT minimum twice a day at home and the use of the Gloreha robot for 45 minutes a week for a period of 4 weeks for the improvement in the performance of the feeding activity in the use of cutlery. Functional Independence Measure (FIM), Box and block test (BBT), Nine Hole Peg Test (The9-HPT) and hand dynamometer were used to evaluate the upper limb movement function and daily life activity.

Results: Changes were observed in the use of upper limb in bimanual tasks, improvement of hand motor ability (precise tasks and gross manual dexterity) and upper-limb ability during functional tasks (in feeding) and patient social participation.

Conclusions: AOT and Gloreha treatment may provide an addition to the rehabilitative interventions currently available for recovery after stroke and could be utilized within standard sensorimotor training.

References:

1. R. La Touche. Métodos de representación del movimiento en rehabilitación ; Construyendo un marco conceptual para la aplicación en clínica. Journal of Move & Therapeutic Science. 2020;2:152 – 9.
2. Choi JW, Kim BH, Huh S, Jo S. Observing Actions Through Immersive Virtual Reality Enhances Motor Imagery Training. IEEE Trans Neural Syst Rehabil Eng. 2020 Jul;28(7):1614-1622. doi: 10.1109/TNSRE.2020.2998123. PMID: 32634098.
3. Fu J, Zeng M, Shen F, Cui Y, Zhu M, Gu X, Sun Y. Effects of action observation therapy on upper extremity function, daily activities and motion evoked potential in cerebral infarction patients. Medicine (Baltimore). 2017 Oct;96(42):e8080. doi: 10.1097/MD.0000000000008080. PMID: 29049194; PMCID: PMC5662360.
4. Hsieh YW, Lin YH, Zhu JD, Wu CY, Lin YP, Chen CC. Treatment Effects of Upper Limb Action Observation Therapy and Mirror Therapy on Rehabilitation Outcomes after Subacute Stroke: A Pilot Study. Behav Neurol. 2020 Jan 2;2020:6250524. doi: 10.1155/2020/6250524. PMID: 32377266; PMCID: PMC7199557.
5. Mancuso M, Tondo SD, Costantini E, Damora A, Sale P, Abbruzzese L. Action Observation Therapy for Upper Limb Recovery in Patients with Stroke: A Randomized Controlled Pilot Study. Brain Sci. 2021 Feb 26;11(3):290. doi: 10.3390/brainsci11030290. PMID: 33652680; PMCID: PMC7996947.
6. Lee HC, Kuo FL, Lin YN, Liou TH, Lin JC, Huang SW. Effects of Robot-Assisted Rehabilitation on Hand Function of People With Stroke: A Randomized, Crossover-Controlled, Assessor-Blinded Study. Am J Occup Ther. 2021 Jan-Feb;75(1):7501205020p1-7501205020p11. doi: 10.5014/ajot.2021.038232. PMID: 33399050.

P060

The electric simulation and proper positioning for mri-based transcranial direct current stimulation in stroke

H. Oh (Gyeonggi-do/KR), D. S. Kim (Incheon/KR), M. J. Yoon (Gyeonggi-do/KR), H. J. Park (Seoul/KR), Y. J. Yoo (Gyeonggi-do/KR), B. Y. Hong (Gyeonggi-do/KR), D. Kim (Seoul/KR), T. Kim (Seoul/KR), H. Kim (Seoul/KR), J. Lee (Seoul/KR), S. H. Lim (Seoul/KR), T. W. Kim (Gyeonggi-do/KR)

Background: Transcranial Direct Current Stimulation (tDCS) is a non-invasive treatment that modulates cortical excitability by placing electrodes on the scalp and generating weak direct currents between them. Because of the promotion of cortical plasticity or restoration of interhemispheric balance, tDCS is known to be beneficial for post-stroke motor rehabilitation, and it is expected to be a promising tool to treat several neurologic disorders in clinical medicine. However, in the clinical application of tDCS, high inter-subject variability in motor outcomes after tDCS in stroke patients has hindered the translation of this intervention into clinical use. One major factor underlying inconsistent tDCS effect is inter-individual variation in anatomy including individual brain anatomy and conductivity of each tissue. Also, post-stroke patients can have brain structural changes like cerebrospinal fluid (CSF)-filled cavities or enlarged ventricles which can contribute to heterogeneous tDCS results.

Objectives: We aimed to identify an optimized tDCS electrode montage that generates the maximal electric field on the hand knob, based on MRI-based brain anatomy and brain lesions of stroke patients for improving upper extremity function.

Method: This study was conducted in 21 hemiplegic stroke patients enrolled in the double-blind, randomized controlled study to evaluate the effect of personalized tDCS for improving upper extremity function. The software "Neuro-

phet tES LAB 3.0" was used to construct an individualized head model from the T1-weighted images of patients and simulate the tDCS-induced electric fields. Configurations for both conventional tDCS and optimized tDCS were determined using tES LAB software for each patient.

Results: In the conventional tDCS, the anode and cathode electrodes are symmetrically placed at positions corresponding to C3 and C4 according to the 10-20 system. In contrast, in the optimized tDCS, the electrode position varied greatly from patient to patient, though the hand knob was set as the same target region. Even when two patients had a similar brain lesion, individualized electrode positions were very different for each patient. The conventional montage generates an electric field intensity of 0.30 V/m with a median value at the hand motor cortex. The optimized tDCS had a median of 0.36 V/m and produced a significantly larger electric field at the target than conventional tDCS in all patients (p-value <0.001). The mean improvement by optimized montage over conventional one was 20**%**.

Conclusion: Our study support that optimized tDCS has benefit in stroke patients who exhibit structural changes in the brain that impede the production of a sufficient electric field. The results of this study could contribute to the development of individualized tDCS protocols for stroke patients.

P061

Current status and successful home discharge rate in inpatient rehabilitation facilities for subjects with stroke in Korea

H. Y. Jung (Incheon/KR), Y. S. Ku (Incheon/KR), M. O. Kim (Incheon/KR), C. H. Kim (Incheon/KR), K. L. Joa (Incheon/KR)

Background & Objects: Since 2018, the Korean Ministry of Health and Welfare and The Health Insurance Review & Assessment Service (HIRA) has been conducting a project of Inpatient Rehabilitation Facilities (IRF) to provide an optimal rehabilitation delivery system for subjects with major disabilies, including stroke. We analyzed the annual status of IRFs, the successful home discharge rate and by applying the integrated rehabilitation function tools for subjects with stroke.

Method: The data of subjects with stroke was received through HIRA for 41 IRFs (February 2018 to December 2020). The admission criteria of the IRFs for stroke subjects was within 90 days after the onset and the maximal length of hospitalization was 180 days. We analyzed distribution of the IRFs, characteristics of stroke subjects, admission status of different stroke types, duration from stroke onset to admission at the IRFs, length of stay (LOS), functional outcomes and outcome efficiencies.

Referring to the results of previous studies, we proposed a "successful home discharge level" (a status of independent ADL at home) at the time of the IRF discharge. The subjects with the following all conditions are obtained; 1) the level of cognitive function (MMSE > 24), and 2) the level of ambulatory function. (BBS > 35), and 3) the level of daily living with minimal assist (MBI > 60). To analyze the impact of each of these factors [age, gender, MMSE, BBS, MBI, MMT, the time of admission to IRF(OAI), LOS] on successful home discharges, multiple logistic regression analysis with stepwise selection were performed.

Results: Total 4,541 stroke subjects met the IRF admission criteria. Among them, subjects with cerebral infarction (CI) (65.1**%**, 67.4**%**, 68.9**%**) were increased and those with

P061 Table 1. Distribution of subjects with different stroke types who met the IRF criteria (2018–2020)

| Years	SAH	ICH	Infarction	Mixed	Total (%)
2018	89(6.8)	345(26.5)	849(65.1)	21(1.6)	1,304
2019	65(6.2)	264(25.0)	710(67.4)	15(1.4)	1,054
2020	146(6.7)	507(23.2)	1,503(68.9)	27(1.2)	2,183
Total (%)	300(6.6)	1,116(27.5)	3,062(64.5)	63(1.4)	4,541(100.0)

P061 Table 2. Changes of rehabilitation outcomes in different types of strokes (2018–2020)

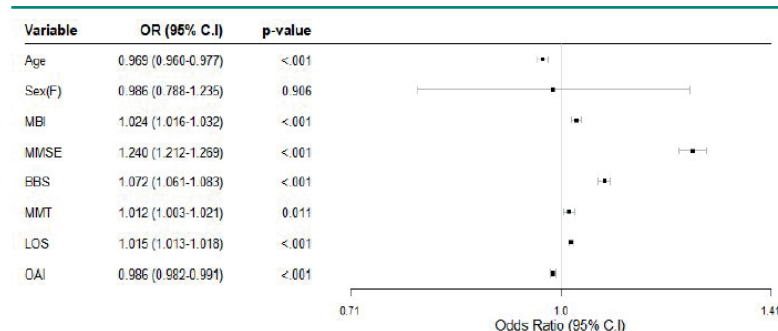|		Admission	Discharge	Gain	Efficiency
MBI	SAH	43.38	52.06	7.72	0.1808
	ICH	42.36	54.88	12.25	0.1710
	Infarction	48.66	59.06	12.04	0.1558
	mixed	36.49	47.23	17.00	0.1674
MMSE	SAH	16.44	19.24	2.51	0.0494
	ICH	18.41	21.35	2.46	0.0379
	Infarction	19.97	21.9	1.97	0.0283
	mixed	16.11	19.3	5.58	0.0390
BBS	SAH	24.37	29.83	5.96	0.1073
	ICH	21.77	29.45	7.48	0.1043
	Infarction	26.23	32.86	7.29	0.1006
	mixed	18.54	22.11	6.95	0.0603

intracranial hemorrhage (ICH) (26.5**%**, 25.0**%**, 23.2**%**) were decreased, but those with subarachnoid hemorrhage (SAH) were not changed (6.8**%**, 6.2**%**, 6.7**%**), respectively **(Table 1)**.

In MBI tests, subjects with CI, ICH and SAH showed a mean efficiency of 0.156, 0.171 and 0.181, respectively. In MMSE tests, subjects with same above stroke types showed a mean efficiency of 0.028, 0.38, and 0.049. And the BBS showed a mean efficiency of 0.100, 0.104, and 0.107. **(Tab. 2)**

The successful home discharge rate of subjects with CI, ICH, SAH was 39.4**%**, 36.5**%**, and 37.7**%** (mean 38.4**%**), respectively. Each IRFs showed a difference in achieving all successful home discharge levels after stroke rehabilitation. **(Fig. 1)** Most important factor influencing successful home discharge following stroke rehabilitation programs was MMSE score at the IRFs' admission. **(Fig. 2)**
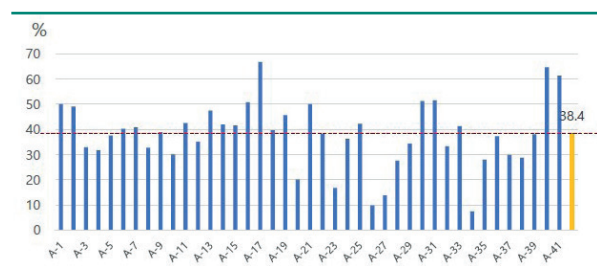
P061 Fig. 1. Different successful home discharge rates at the 41 IRFs following stroke rehabilitation

Variable	OR (95% C.I)	p-value
Age	0.969 (0.960-0.977)	<.001
Sex(F)	0.986 (0.788-1.235)	0.906
MBI	1.024 (1.016-1.032)	<.001
MMSE	1.240 (1.212-1.269)	<.001
BBS	1.072 (1.061-1.083)	<.001
MMT	1.012 (1.003-1.021)	0.011
LOS	1.015 (1.013-1.018)	<.001
OAI	0.986 (0.982-0.991)	<.001

P061 Fig. 2. Affecting factors on successful home discharge for subjects with stroke in the IRFs

Conclusion: Over the years, more subjects with subacute stroke were using Korean national rehabilitation delivery system and all functional outcomes were improved with the IRFs' rehabilitation programs. Instead of 30-days readmission rate, successful home discharge rate was introduced as a new marker for community wellbeing following stroke rehabilitation.

P062

Feasibility and outcomes of early supported discharge for acute stroke patients in Korea: preliminary results from a multi-center randomized controlled trial

H. M. Cho (Seongnam-Si/KR), J. S. Choi (Seongnam-Si/KR), W. K. Chang (Seongnam-Si/KR), S. Jee (Daejeon-si/KR), M. K. Sohn (Daejeon-si/KR), Y. I. Shin (Pusan-si/KR), S. H. Ko (Pusan-si/KR), W. S. Kim (Seongnam-Si/KR), N. J. Paik (Seongnam-Si/KR)

Background: Early supported discharge (ESD) is an approach aimed at expediting the discharge of post-acute stroke patients by providing comprehensive rehabilitation services in their homes. The effectiveness of ESD varies across healthcare systems, and its feasibility in Korea remains unexplored.

Objectives: This study sought to assess the effectiveness of ESD for patients with acute stroke in Korea, comparing it with conventional post-stroke rehabilitation therapy.

Method: A pragmatic multicenter randomized controlled trial was conducted across three university hospitals in South Korea. **Table 1** outlines the inclusion and exclusion criteria. The ESD group received individualized discharge planning, goal setting, and a tailored 4-week home-based rehabilitation program, including at least 30 minutes of physical and occupational therapy sessions per week.

**P062 Table 1.** Inclusion criteria and exclusion criteria

	Adult patients aged 20 years and above.
	Patients admitted to the neurology/neurosurgery department for rehabilitation following acute stroke (excluding TIA).
	Patients with mild neurological impairment (meeting the following criteria within 14 days of onset).
Inclusion criteria	-mRS score of 1-3.
	-FAC score of 3 or higher.
	-K-NIHSS consciousness assessment items (1a, 1b, 1c) all scoring 0.
	Patients with a caregiver residing within 30 minutes from the hospital.
	Patients willing to actively participate in the ESD program.
	Medically stable patients who can be discharged home within 30 days of onset.
	Patients with severe behavioral disorders.
	Patients with indwelling urinary catheter.
	Patients unable to take oral food intake.
Exclusion criteria	Patients with uncontrolled pain.
	Patients with significant psycho-behavioral issues.
	Patients with severe cognitive impairment (K-MMSE score below 15) who are unable to participate.

TIA: Transient Ischemic Attack; mRS: Modified Rankin Scal; FAC: Functional Ambulation Category; K-NIHSS: Korean version of the National Institutes of Health Stroke Scale; K-MMSE: Korean version of Mini-Mental State Exam

The control group received standard post-acute stroke care, including discharge planning and follow-up rehabilitation services. Both groups were eligible for outpatient rehabilitation therapy as needed. Outcome measurements were col-

lected at baseline (T0), four weeks after discharge (T1), and 12 weeks post-stroke (T2). Evaluations included the Korean Modified Barthel Index (K-MBI), the Korean version of the Patient Health Questionnaire-9 (PHQ-9), the Korean Version of Stroke Impact Scale (K-SIS), and demographic variables.

Results: A total of 61 patients with acute stroke participated, with 30 patients assigned to the ESD group. The average age of the ESD group was 68.5±13.4 years, while the control group had an average age of 63.1±10.2 years. The mean length of hospital stay was 17.87±7.57 days in the ESD group and 18.39±9.02 days in the control group. Both groups showed increased average K-MBI scores over time (ESD: T0 77.30±15.35, T1 92.53±14.32, T2 92.26±17.69; control: T0 77.90±12.67, T1 93.75±9.24, T2 94.76±12.92). Both groups exhibited a decreasing trend in PHQ-9 scores from T0 to T2, with a slight increase observed between T1 (3.75±4.44) and T2 (4.20±5.4) in the control group. K-SIS scores increased in both groups, with T1 scores of 79.75±12.56 for the ESD group and 81.63±12.93 for the control group, and T2 scores of 80.88±15.72 and 83.41±16.65, respectively. No significant
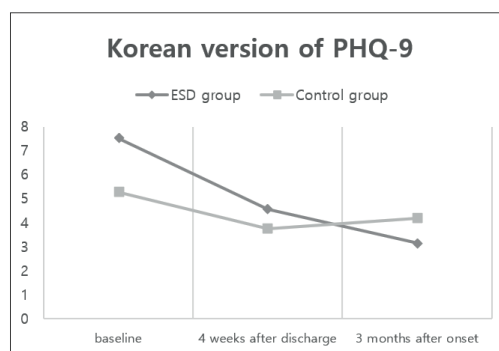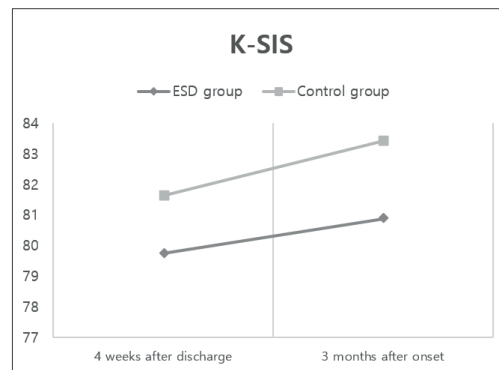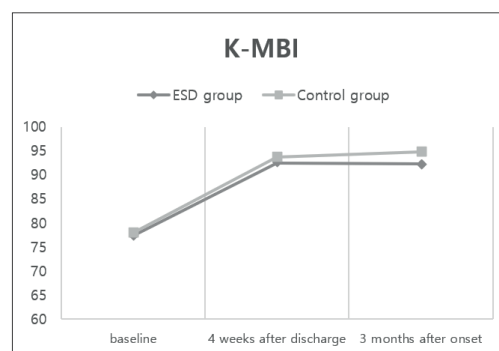
P062 Fig. 1. Comparison of evaluation indicators between the ESD group and the control group. ESD: early supported discharge; K-MBI: Korean Modifies Barthel Index; PHQ9: Patient Health Questionnaire-9; K-SIS: Korean Version of Stroke Impact Scale

differences were found between the two groups for any variables at T0, T1, or T2 (P>0.05). **Figure 1** illustrates the changes in outcomes over time for both groups.

Conclusion: Clinical and patient-reported outcomes did not significantly differ between the ESD and control groups. Although the average length of hospital stay was non-significantly shorter in the ESD group, these **Results** suggest that ESD is feasible for patients with acute stroke in Korea. However, further measures are needed to optimize the discharge process to home.

P063

A Single case of rehabilitation for an Aphasia patient in the acute stroke phase by using alternative tools to go to the toilet alone

G. Koyama (Tokyo/JP), K. Ito (Tokyo/JP), A. Otaka (Tokyo/JP), K. Sasaki (Tokyo/JP), C. Kato (Tokyo/JP)

Introduction: It is often hard to undertake rehabilitation of daily tasks for Aphasia stroke patients due to language problems.

Objectives: The purpose of this study is to report my rehabilitation case of a patient who was not physically paralyzed but was unable to go to the toilet due to Aphasia and the rehabilitation for the patient using alternative tools.

Patients & methods: The patient is a man in his seventies with an acute temporal parietal cerebral hemorrhage that caused him to suffer from Aphasia. He could walk normally because he did not have paralysis or a sensory disability. However, he could not find the toilet due to his lack of ability to read words or marks. I evaluated his speech ability as Anomic Aphasia. In particular, he had lost the ability of reading and the ability of naming and word finding. However, he retained the ability to speak and understand single classifications like color and shape.

Neuropsychological findings: Digit Span (forward 4, backward 3), Line Cancellation (34/34), Star Cancellation (54/54), Trail Making Test Part A (disorder), Token Test (A 7/7, B 7/8, C 0, D 0, E 0, F 0), Western Aphasia Battery (Spontaneous speech 15/20, Auditory Verbal comprehension 8.2/10, Repetition 9.8/10, Naming and word finding 3.5/10, Reading 1.7/10, Writing 4.65/10, Apraxia right 9.8/10 left 9.8/10, Constructional, Visuospatial, and Calculation tasks 9.1/10, WAB criteria for classification is Anomic Aphasia).

The target of his rehabilitation was his going to the toilet alone. The first step was training the patient to identify color blocks in an attempt to use his good residual capacity. Color blocks as alternative tools were used for him to understand the elements of toilet symbol marks. When asked what the color or shape of the block was, he could answer the questions after eight days. The second step was showing him some illustrations and pictographs of daily tools, including toilets, as alternative tools. The patient practiced the name of illustrations or pictographs for eight days. The third step was looking for real toilets by walking around the hospital to identify toilet marks over three days.

Results: After nineteen days, the patient could identify the toilet mark and go to the toilet alone during his hospital stay.

Conclusion: Ayesha said alternative tools have been successfully used in some cases of speech and language disorders like Aphasia (Ayesha et al., 2022). For this study, I attempted to treat the patient by using alternative tools so that he could go to the toilet. As a result, it is suggested that alternative

tools such as color blocks, pictographs, and illustrations were able to be effective for the acute Aphasia patient who has lost the ability to read, name items, or word find, during rehabilitation. It is, however necessary to consider that the study was only a single case, and the patient could have recovered naturally due to the acute stroke phase.

P065

Local vibrations and spasticity treatment in subacute stroke: a controlled single-blinded randomized trial

S. Julliand (Dijon/FR), J. Gaveau (Dijon/FR), C. Delphin (Dijon/FR), C. Papaxanthis (Dijon/FR), D. Laroche (Dijon/FR)

Introduction: Stroke is a worldwide leading cause of disability, with 27–40**%** of patients developing spasticity. Local muscle vibration has been proposed as a non-pharmacological treatment to overcome spasticity, showing positive **Results** during the chronic phase. However, information is still scarce about its effects on the subacute phase post-stroke, which represent the best therapeutic window to promote neuroplasticity. More, little is known about the neurophysiological mechanisms subtending the beneficial effect of vibration on spasticity.

Objectives: This protocol aims to evaluate the effects of 6 weeks of vibration program on the incidence of spasticity in the affected side of a subacute stroke population. A secondary **Objective** is to dissect the

Methods: Inclusion and non-inclusion criteria described in Table 1. Figure 1 shows the protocol design with the main evaluations and measures. The intervention lasted 6 weeks, with 3 vibration sessions per week on the wrist and elbow flexors. The vibrated limb was relaxed and hidden. The control group (SHAM) received 40Hz-0.5mm vibrations through a foam band, whilst the intervention group (INT) received 80Hz-0.5mm vibrations directly on the skin. To measure spasticity, we used the modified clinical Ashworth scale (MAS), an isokinetic ergometer, and electromyograms. To evaluate the arm function, the Fugl-Meyer Assessment for upper extremity (FMA-UE) was performed. Spinal excitabil-

P065 Table 1: Inclusion and non-inclusion criteria

Inclusion criteria	Non-inclusion criteria
- ≥ 18 years old - Medically stable (i.e. able to follow a rehabilitation program) - First stroke ever < 6 weeks - FMA-UE score < 48/66 - Signed informed consent	- Pain when mobilizing wrist or elbow (VAS > 5) - Other pathology impacting the upper limb - Unable to understand: LAST < 5/7 and true/false <9/10

FMA-UE: Fugl-Meyer Assessment for Upeer Extremity; VAS: Visual Analogue Scale; LAST: Language Screening Test
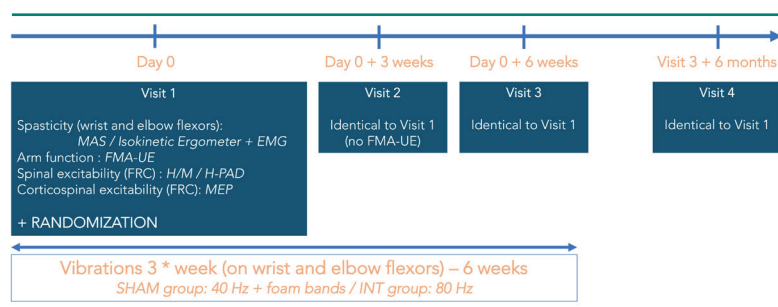
P065 Fig. 1. Protocol design

MAS: Modified Ashwoth Scale; EMG: ElectroMyoGramm; FMA-UE: Fugl-Meyer Assessment for Upeer Extremity; H-PAD: H-reflex Post Activation Depression; MEP: Motor Evoked Potential

ity was evaluated with the H/M ratio and the H-reflex post-activation depression (H-PAD) at the flexor carpi radialis (FCR). Corticospinal excitability was assessed with transcranial magnetic stimulation recorded at the FCR.

Results: Nine patients have been recruited so far. Our results showed a good adherence of the studied population to the protocol. Both groups felt vibrations 100**%** of the time, with 0**%** illusions in the SHAM group and 86.3**%** illusions of wrist and arm movements in the INT group. We found a slim reduction in the MAS scores at the wrist and a slight improvement in the FMA-UE scores in the INT versus SHAM groups. The H-PAD and the H/M ratio seems to decrease and increase respectively, in both groups.

Conclusion: To our knowledge, this is the first study investigating the impact of a chronic vibration protocol in a subacute stroke population. Patients' treatment adherence was good in our population and the difference of illusional perception between SHAM and INT groups seemed confirmed. Local muscle vibrations have shown a trend to improve the patient's functional impairments.

Inclusion is ongoing and by the time of the congress, we will have more participants and more results to discuss.

P066

Feasibility and effectiveness of FES-Cycling on post-stroke patients: preliminary results

M. Descollonges (Dijon/FR), L. Popović-Maneski (Belgrade/RS), A. Metani (Lyon/FR), A. Radić (Belgrade/RS), J. Di Marco (Lyon/FR), J. Brugniaux (Grenoble/FR), G. Deley (Dijon/FR)

Introduction: Hemiparesis (HP) is a partial loss of motor function on one side of the body, mainly caused by ischemic or hemorrhagic strokes. HP is present in nearly 90**%** of post-stroke patients and ranks as the leading cause of severe and long-term disability. Restoration of functional capacities is therefore paramount during post-stroke rehabilitation. Clinical evidence suggests that functional electrical stimulation cycling (FES-Cycling), which combines voluntary cycling with lower limb electrical stimulation, can help to reduce motor impairments for HP patients. Several studies already demonstrated the feasibility and effectiveness of FES-cycling rehabilitation in stroke patients but little is known regarding the size of these effects as compared with those obtained after conventional rehabilitation programs.

Method: 13 patients with HP following ischemic or hemorrhagic strokes were recruited and divided randomly into two cycling groups, with FES (n=7) and without (n=6; CON). Each session lasted 30 minutes: 5 minutes of warm-up, 20 minutes of FES-cycling or cycling at 60**%** of maximal aerobic power, and 5 minutes of cool-down. FES was applied on quadriceps, hamstrings, and gluteus muscles at the maximally tolerated intensity using a FES-cycle ergometer (HephaBike, Kurage, France). The effects of rehabilitation programs were assessed through Quadriceps muscles' thickness (ultrasound technique), maximal aerobic capacity and walking capacities (10 meters and 6 minutes walk tests). In addition, to cycling exercises, patients from both groups received the conventional stroke rehabilitation program of physiotherapy based on the neurodevelopmental facilitation approach and occupational therapy focused on activities of daily living during the experiment (60 min/day, five days/week).

Results: Results revealed significant benefits in both groups on VO$_2$max (FES: +18.3**%**; CON: +21**%**), maximal aerobic power (FES: +60**%**; CON: +50**%**), gait perimeter (FES: +43.8**%**; CON: +37.8**%**) and gait time (FES: +19.95**%**; CON: +10.37**%**). Quadriceps muscle thickness was measured only in the FES group and increased between 17 to 25**%** for rectus femoris and vastus intermedius muscles, respectively.

Conclusion: The study showed that 24 sessions of FES-cycling had beneficial effects on all parameters. In addition, this exercise modality was well-tolerated and accepted by the patients. However, these are preliminary data obtained in a small group of patients and more research are needed to obtain clear conclusions and to quantify the differences between FES and control groups.

P068

The early stroke rehabilitation systems gaps

M. Yazdani (Isfahan/IR), A. Chitsaz (Isfahan/IR), M. Saadatnia (Isfahan/IR), M. Ghasemi (Isfahan/IR)

Background: Efforts to identify beneficial rehabilitation program characteristics in stroke patients are ongoing. goals of this study that attention at the time of each session of intervention and Performing exercises with high intensity until exhaustion according to the evaluation and progress of patients.

Methods: The sample included twelve hemiparetic patients (54.3 ± 15.4 years old) with ischemic stroke (n=7 control, n=5 intervention). The study was started as early as possible after stroke and included an intervention group (including passive range of motion exercises, resistance training, assisted standing up, and active exercises on the healthy side of the body, in addition to encouraging voluntary contraction of affected limbs as much as possible, performing exercises with high intensity until exhaustion, three months, six days a week, for two to three hours per session.) and control group including standard rehabilitation. The Fugle-Meyer Assessment, Box and Blocks Test and time up and go assessments were conducted.

Results: There was a significantly greater improvement in the intervention group compared to the control: FMA lower limbs (p=0.001), total motor function (p=0.002)and TUG test (p=0.004). but no significant difference in FMA upper limbs between groups (p=0.51) and BBT test (p=0.3).

Conclusions: According to the results of this study, if we emphasize voluntary and intense contractions and increase the time of the sessions until we reach exhaustion and remove the time limit factor (45–60 minutes) for the sessions, we will get better **Results** in less time.

Keywords: stroke, early rehabilitation trial, motor function, systems gaps

P069

The influence of trunk control on activities of daily living, gait independence, balance and falls, quality of life and community mobility in patients with stroke: a cohort study

S. Al Qahtani (Jeddah/SA), F. Khan (Jeddah/SA)

Background: Stroke is the leading cause of chronic disability in adults (Donkor, 2018). However, following a stroke, trunk

function is commonly affected, which affects balance, gait, and Activities of daily living (ADLs) (Collin & Wade, 1990; G et al., 2006). Trunk control is a key motor skill that is required for performing a variety of functional tasks (Fujiwara et al. 2004). The importance of trunk function, particularly that related to the static sitting balance, is reported for predicting functional prognosis following stroke, trunk function is a reliable predictor for independence of ADL's, gait independence, balance, and many functional outcomes after stroke (Ishiwatari et al., 2021; Duarte et al., 2010; Smith et al., 2017; Veerbeek et al., 2011).

Purpose: Prospective cohort study aims to find out whether ADLs, gait independence (GI), balance and falls and community mobility are better predicted by using trunk control test for stroke survivors after 3months.

Methods: Twenty acute stroke survivors aged >18 were personally assessed for trunk control test as an independent variable in in-patient setting of the ministry of health hospitals and followed for 3 months for assessing ADLs, balance and falls, GI and community mobility as a dependent variable.

Outcome measures: Trunk Control Test (trunk control), Activities-Specific-Balance Confidence (Balance), Barthel index (ADL's), Functional Ambulation Categories (GI), Modified falls efficacy and number of falls (fear of fall and falls), Reintegration to Normal Living Index (Community mobility).

Results: The mean age of subjects were 58.52±11.7 years with a mean duration of stroke of 11.6±7.4 days. Balance was the most significant variable(b=0.560,p=0.005,95% CI;0.40 to 0.73) the other variables include: GI(b=-0.481, p=0.1,95%,CI;-0.81 to-0.28), falls and fear of fall (b=0.74, p=0.08, 95%CI; 0.01 to 0.68), ADL's (b=-0.76, p= 0.07, 95% CI; -0.52 to 6.97), community mobility(b=-0.06, p= 0.8, 95% CI;-48.20 to 43.69).

Conclusion: balance has shown to be better predicted by trunk control test rather than other variables in patients with stroke.
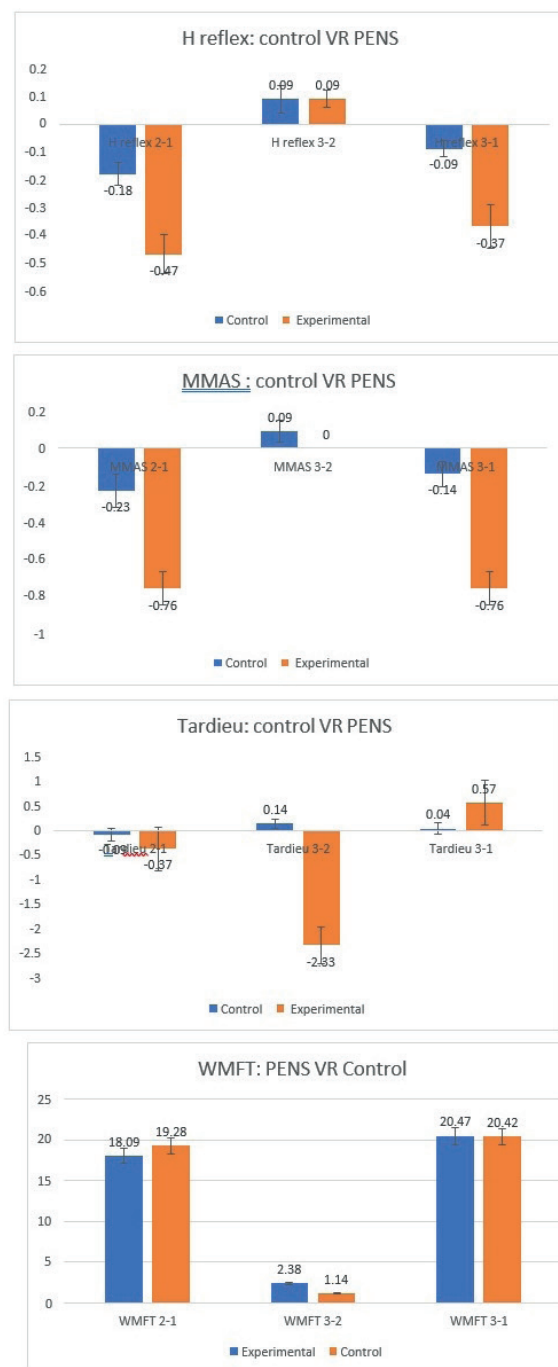
P070

Clinical trial: effect of percutaneous electrical nerve stimulation (PENS) on wrist flexor spasticity and motor function in stroke survivors

S. Kamble (Pune/IN), G. Baxi (Pune/IN), A. Joshi (Pune/IN), T. Palekar (Pune/IN)

Introduction: TENS has been hypothesised to regulate spasticity through several mechanisms such as lowering stretch reflex excitability, modulating reciprocal inhibition, and boosting pre synaptic inhibition, according to the literature. Dry needling has a good effect on both pre and post synaptic inhibition, although earlier research has suggested that TENS does pre synaptic inhibition to alleviate stiffness. As a result, there is a need to combine Dry Needling and TENS to examine the effect on wrist flexor spasticity in hemiplegic individuals.

Aim: To find the effect of PENS on spasticity and motor function in stroke individuals.

Method: 42 stroke victims were divided into (A) Experimental Group VR (B) Control Group at random using the coin toss method. The patients received PENS in addition to conventional treatment, which included needle insertions with PENS stimulation into the flexor carpi radialis and ulnaris muscles on the afflicted side. Each 3-treatment ses-

P070 Fig. 1

sion lasted 15 minutes. Group B received solely conventional care. H reflex-(Amplitude) Modified Modified Ashworth Scale (MMAS), Modified Tardieu Scale (MTS), and Wolf Motor Functional Test (WMFT) measurements were obtained before (1), after (2), and one weak follow up(3).

Result: In a between-group study, the h-reflex 2 vs 1 (0.0001) and 3 vs 1 (0.012) exhibited statistical significance. Additionally, MMAS and MTS findings for 2 vs 1 and 3 vs 1 (0.0001) also showed statistical significance, but no statistical significance was identified for motor function.

Clinical trial: CTRI/2022/09/045387

	Control			Experiment			P value	z
Mean	Mean+	Standa	Media	Mean+/-SD	Standa	Media		
H reflex 2-1	-	0.04	-0.12	-0.47+/-0.35	0.07	-0.31	0.0001	3.5
H reflex 3-2	0.09+/-	0.05	0.01	0.09+/-0.18	0.03	0.10	0.14	-
H reflex 3-1	-	0.03	-0.09	-0.37+/-0.39	0.08	-0.23	0.012*	-

MMAS

	Control			Experiment al			P value	z
Mean differenc e	Mean+/ -SD	Standar d error	Media n	Mean+/-SD	Standar d error	Media n		
MMAS2-1	-0.23+/- 0.43	0.09	0.00	-0.76+/-0.43	0.09	-1.0	0.0001 *	- 3.3 5
MMAS3-2	0.09+/- 0.30	0.06	0.00	0.00+/-0.00	0.00	0.00	0.152	- 1.4 3
MMAS3-1	-0.14+/- 0.35	0.07	0.00	-0.76+/-0.43	0.09	-1.00	0.0001 *	- 3.9 8

MTS

	Control			Experiment al			P value	z
Mean differenc e	Mean+/ -SD	Standar d error	Media n	Mean+/-SD	Standar d error	Media n		
Tardieu 2-1	-0.09+/- 0.62	0.13	0.00	-2.33+/-2.03	0.44	-2.00	0.0001 *	- 4.1 8
Tardieu 3-2	0.14+/- 0.47	0.10	0.00	0.57+/-1.71	0.37	0.00	0.207	- 1.2 6
Tardieu 3-1	0.04+/- 0.58	0.12	0.00	-1.76+/-2.07	0.45	-2.00	0.0001 *	- 3.8 2

	Experiment al			CONTRO L			P valu e	z
Mean differenc e	Mean+/-SD	Standar d error	Media n	Mean+/- SD	Standar d error	Media n		
WMFT 2-1	18.09+/- 10.54	2.30	15.00	19.28+/- 9.52	2.07	20.00	0.59 3	- 0.5 3
WMFT 3-2	2.38+/-4.90	1.07	0.00	1.14+/-3.07	0.67	0.00	0.47 6	- 0.7 1
WMFT 3-1	20.47+/- 10.82	2.36	20.00	20.42+/- 8.82	1.92	20.00	0.94 9	- 0.0 6

P070 Fig. 2

References:
1. Hadi S, Khadijeh O, Hadian M, Niloofar AY, Olyaei G, Hossein B, Herrero P, et al. The effect of dry needling on spasticity, gait and muscle architecture in patients with chronic stroke: A case series study. Top Stroke Rehabil. 2018; 25(5):326 – 32.
2. Calvo S, Quintero I, Herrero P. Effects of dry needling (DNHS technique) on the contractile properties of spastic muscles in a patient with stroke: A case report. Int J Rehabil Res. 2016;39(3):372 – 8.
3. Patricia A Downie. Cash's Textbook of Neurology for Physiotherapists. Edition 4th.
4. Nunez-Cortes R, Cruz-Montecinos C, et al. Effectiveness of Dry Needling in the Management of Spasticity in Patients Post Stroke. J Stroke Cerebrovasc Dis. 2020 Nov;29(11):105236.
5. Gillard PJ, Sucharew H, Kleindorfer D, Belagaje S, Varon S, et al. The negative impact of spasticity on the health-related quality of life of stroke survivors: a longitudinal cohort study. Health Qual Life Outcomes. 2015;13:c6

P071

Effect of dry needling in post stroke individuals on spasticity by using H Reflex: clinical trail

S. Kamble (Pune/IN), G. Baxi (Pune/IN), T. Palekar (Pune/IN)

Introduction: Dry needling (DN) is a type of therapy that is used to treat myofascial trigger points and a variety of pain conditions. Currently, objective evidence supports the usefulness of DN in neurological diseases. The H reflex and the modified Tardieu scale were used to assess the spasticity.
Objective: The aim of this study was to investigate effect of dry needling on spasticity in stroke patients using the H reflex and modified Tardieu scale.
Methods: A randomised controlled trial was carried out. 81 stroke survivors were randomly assigned to one of two groups: one had six sessions of DN over the muscles with conventional tretemnt , while the other received conventional care. The H reflex and the modified Tardieu scale were used to assess spasticity. All outcome measures were analysed before (1), after (2), and two weeks later (3).
Results: After the intervention, people who received DN had less spasticity. H3–H1 is statistically significant (P=0.42) in the experimental group against the control group. T3–T1 and T2–T3 are statistically significant (p=0.00) in the experimental group against the control group.
Conclusions: The application of DN appears to have an immediate effect on lowering spastic muscle tone and local muscle stiffness. This could be because DN diminishes the nodular zone of spastic muscle and reduces the firing of alpha motor neurons. These findings are very encouraging in terms of lowering spasticity.

Clinical trial : CTRI/2020/03/024082

References:
1. Sánchez-Mila Z, Salom-Moreno J, Fernández-De-las-peñas C. Effects of dry needling on poststroke spasticity, motor function and stability limits: A randomised clinical trial. Acupunct Med. 2018;36(6):358 – 66. Ansari NN, Naghdi S, Fakhari Z, Radinmehr H, Hasson S. Dry needling for the treatment of poststroke muscle spasticity: a prospective case report. NeuroRehabilitation. 2015 Jan 1;36(1):61–5.

P072

Reimagining post-stroke hand function recovery through an examination of the barriers and facilitators of hand telerehabilitation

J. Banihani (Winnipeg/CA), M. A. Choukou (Winnipeg/CA)

Background: Telerehabilitation has gained significant attention as a promising solution to address the challenges faced by individuals who have suffered from a stroke in accessing rehabilitation services and maintaining their practice after being released from hospital care. We introduce iManus, an innovative telerehabilitation platform that combines glove and software applications for therapists and patients. The platform facilitates training for individuals with upper extremity dysfunctions through a flexible program that offers visual feedback and task-oriented exercises.
Objectives: The study aimed to identify key challenges, lessons learned, and recommendations for optimizing telerehabilitation procedures in stroke patients.
Methods: We opted for a combination of literature review and interview data following an empirical study. We first conducted a comprehensive review was conducted to gather existing knowledge on telerehabilitation technologies used in stroke patients, focusing on studies that explored chal-

lenges, lessons learned, and recommendations in the field. Second, we collected qualitative data through interviews with a research participant and their family caregiver to gather insights from a stroke patient who underwent the proposed comprehensive hand telerehabilitation intervention supported by iManus. We ran a thematic analysis to analyze the qualitative data, identifying common themes, patterns, and categories related to challenges, lessons learned, and recommendations for optimizing telerehabilitation procedures.

Results: The literature review revealed several challenges in providing telerehabilitation for hand function recovery in stroke patients, including technical difficulties, the need for customized programs, and the importance of regular support and monitoring. Recommendations from the interviews conducted with a research participant and their family caregiver emphasized i. promptly resolving technical problems, ii. adopting user-friendly technology, and iii. implementing continuous support mechanisms to improve telerehabilitation procedures for optimal outcomes.

Discussion and Conclusions:

Telerehabilitation has the potential to assist in hand rehabilitation for stroke patients. Addressing technical challenges, providing individualized care, and implementing ongoing support mechanisms are essential for successfully implementing telerehabilitation services. These insights guide optimal approaches to enhance the accessibility, engagement, and effectiveness of telerehabilitation programs in hand rehabilitation. Further research is needed to expand participant sample sizes and explore long-term outcomes for valid efficacy findings.

P073

Clinical and neurophysiologic effects of upper limb robot-assisted rehabilitation on motor recovery in patients with subacute stroke: preliminary results

S. Pournajaf (Rome/IT), M. Goffredo (Rome/IT), M. Franceschini (Rome/IT), O. B. O. Italian PowerUPS-REHAB Study Group (Italy/IT)

Background: The promising effects of Upper Limb (UL) Robot-Assisted Therapy (RAT) has been proven by literature and its use in clinical routine is escalating. Task-specific, high intensity and repetitive exercises are defined as key points to facilitate motor re-learning in neurorehabilitation, as RAT can provide with an assisted-as-needed approach.

Aim: This RCT's aims are: i) investigating the clinical effects of an exoskeleton robotic system for the UL rehabilitation compared to Conventional Therapy (CT) in subacute stroke subjects; ii) detecting whether the UL-RT could elicit a greater brain stimulation.

Methods: Subjects with severe or moderate hemiparesis (Fugl-Meyer Assessment (FM)-UL (FM-UL≤44) following first-ever cerebral stroke in subacute stage (Distance from Stroke Onset-DSO≤3 months); sufficient cognitive and stable general clinical conditions were recruited after signing the informed consent, and randomly assigned into Experimental Group-EG receiving UL-RAT through Armeo®Power exoskeleton (Hocoma AG, CH) for 25 sessions-5 days/week—

P073 Table 1

Change T1-T0, mean±sd	EG	P value (intra)	CG	P value (intra)	p-value (tra gruppi)
FMA-UE Shoulder (A)	11.2±8.1	0.037	5.7±12.4	0.423	0.451
FMA-UE Wrist (B)	2.8±4.1	0.200	2.0±0.8	0.016	0.715
FMA-UE Hand (C)	4.8±5.5	0.120	3.2±1.5	0.023	0.602
FMA-UE Coord/Vel. (D)	1.4±2.2	0.226	1.0±0.8	0.092	0.742
FMA-UE Motro Function (A-D)	20.2±19.2	0.078	12.0±14.4	0.195	0.503
FMA-UE (TOT: A-J)	27.6±30.5	0.113	-4.5±34.5	0.811	0.182
MAS Tot	0.0±0.0	NA	-0.5±0.6	0.182	0.089
BBT affected side	2.4±4.8	0.329	14.0±10.4	0.075	0.061
mBI (0-100)	31.0±21.8	0.034	28.0±14.4	0.030	0.821
MRS (0-6)	-1.4±1.1	0.052	-1.0±0.0	NA	0.511
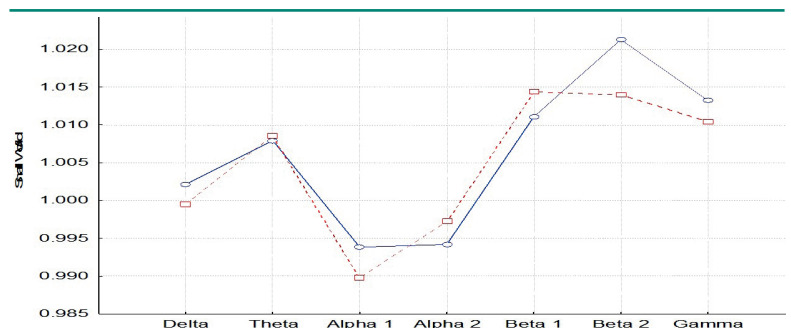
P073 Fig. 1

45minutes each; or Control Group-CG receiving CT, in addition to the regular rehabilitation program. All participants were assessed clinically at baseline (T0) and at the end of the treatment (T1). The motor evaluation part of FM-UL (0–66) were considered as the primary outcome. Clinical assessments were set based on International Classification of Function, Disability and Health (ICF). A patients' satisfaction was evaluated in EG by Technology Acceptance Model (TAM) at T1 only. Moreover, patients in EG were evaluated at T0 and T1 via Electroencephalography (EEG). Brain electrical activity were recorded during rest conditions with closed and open eyes (5 minutes each).

Results: 10 subjects (4 males; mean age=63+9) were randomized to EG (N=5) or CG (N=5; 1 dropped out for COVID-19 related issues). No between-group difference at T0 were found. The clinical assessments analyzed by paired-sample T-test showed a non-significant improvement in both groups, expect the FM-UL which were resulted statistically improved at shoulder in EG (p-value=0.037), while at wrist and hand in CG (p-value=0.016 and 0.023, respectively). TAM questionnaire results were positively over 5 in all its domains. EEG results, although not significant probably due to the small and heterogenous sample, reveled a remodulation at the alpha 1 and beta 2 bands.

Conclusion: This study protocol is feasible and UL-RAT through Armeo®Power exoskeleton is well-accepted by stroke subjects in sub-acute stage. The preliminary results showed can be considered promising and support the study hypothesis. However, good significance has not yet been reached to support any conclusion. Further robust studies on large samples are needed to derive reliable clinical indications and verify the neurophysiological phenomenon.

Ethical statement: *Approved by Ethics Committee of IRCCS San Raffaele Rome; clinicaltrialsregistration.gov Identifier: NCT04697368*

P074

Introduction of intraregional stroke rehabilitation networking program

I. S. Choi (Gwangju City/KR), H. M. Kim (Gwangju City/KR), H. S. Jo (Gwangju City/KR), H. K. Park (Gwangju City/KR), J. Y. Han (Gwangju City/KR), M. K. Song (Gwangju City/KR)

Objective: It is crucial for stroke patients to receive professional and continuous rehabilitation to obtain better functional outcome and return to daily life. However, in our country, most stroke patients are wandering various rehabilitation hospitals or convalescent hospitals in every two to three months after discharge from acute stroke unit. Under these circumstances, Intraregional Stroke Rehabilitation Networking Program was launched at a State-designated Regional Cardiocerebrovascular Center to provide continuous and proper rehabilitation service after transfer to local rehabilitation hospitals. The concept and progress of the program will be introduced in this interim report.

Methods: The aim of this program was to provide rehabilitative care with consistency even after patients are discharged from Regional Cardiocerebrovascular Center. Our center signed MOU (memorandum of understanding) with several rehabilitation hospitals in our region. Stroke patients who got treatment at our center in acute stage were transferred to these hospitals. Workshops for therapists in the hospitals with partnership were held regularly to verify evaluation protocol. Education about rehabilitative management for patients and caregivers were performed. Patient education materials and brochures for stroke patients were also offered at the same time, so that continuous management would be achieved after discharged from our center. In order to follow-up functional status of the patients, functional evaluation was carried out at the time of 3, 6, and 12 months after stroke onset and the data were shared with our center.

Results: Five rehabilitation hospitals participated in our networking program. From 2017 to June 2022, total 646 stroke patients were included and 130 times of patient education were performed. The average length of stay in rehabilitation hospitals was 63 days and 43 percent of patients returned to their daily lives after discharge from the local rehabilitation hospitals. In the course of working on the program, we did subgroup analysis in the patients who completed 6-month follow-up. We compared functional gain between patients who got rehabilitative management in rehabilitation hospitals with partnership and patients who received rehabilitative management in our center during subacute stage. There was no significant difference of K-MBI (Korean version of Modified Barthel Index) gain between the two groups. It seems that steady cooperation could provide proper rehabilitative care equivalent to management in our center. Ever since the program was firstly started at our center, similar programs were widely spread to other Regional Cardiocerebrovascular Centers.

Conclusion: Intraregional Stroke Rehabilitation Networking Program showed promising results up to now. This kind of referral system may help stroke patients to get effective and systematic rehabilitation so they can successfully return to their daily life.

P075

How an innovative day-care structure can improve patient's recovery after a stroke or brain injury: a qualitative study

N. Rossello (Lyon/FR), H. Rouzé (Lyon/FR), S. Fanara (Lyon/FR), N. Sallet (Lyon/FR), L. Derex (Lyon/FR), A. Termoz (Lyon/FR), A. M. Schott (Lyon/FR), G. Rode (Lyon/FR), J. Haesebaert (Lyon/FR)

Introduction: To respond to the needs of brain-injured patients (stroke or brain injury) after they return home, the ARRPAC association (Accompaniment, Rehabilitation, Post-str

oke and Head-injury), supported by patients and hospital physicians, set up a new experimental day-care center. This center provides programs based on physical and cognitive activity, therapeutic education and support targeting participation according to the ICF model (WHO, 2001). The vision of ARRPAC is that the patient projects himself towards a positive future, thanks to an active approach in a secure environment based on stimulation, exchange and benevolence.

Objectives: We aimed to evaluate how this innovative program integrates patient's pathway after home return, how it responds to patient needs and explore its impact on patient experience.

Patients & Methods: All patients entering the program were included in the study, directly from the launch of the program in June 2022 until April 2023. We conducted semi-structured interviews at the end of the program with a subsample of patients. Interviews explored needs and objectives, results achieved, experience and satisfaction.

Results: A total of 49 patients completed the program on the studied period. Among them, 11 participated (72.7% men, median age 55 years, 90.9% stroke) to a semi-structured interview after completing the 8 to 16 weeks program. Main sequelae were walking disorders (81.8%) and attention disorders (54.5%). The program was considered as a new step in the overall recovery process. Needs and **Objective**s mentioned were about physical activity, general wellness and emotional management. 90.9% declared that they reached their objective at the end of the program and 9.1% declared that they progressed, but there was still progress to be continued. The patients felt a gain in self-confidence, appeasement and empathy, thanks to an attentive and caring team. The group activities permitted patients to meet each other and to create a collective emulation. The program reinforced their active life. They were highly satisfied about the support received and they mentioned a need for continuity. They wanted to maintain a link with the day-care center and other patients in the longer term to create a community.

Conclusion: The initial results are promising in terms of responding to individual needs and capacity enhancement. The evaluation must be continued in order to document the implementation at the organizational level (integration into the territorial care and medico-social offer) and maintenance of the structure over time.

P076
Interrater reliability of the Gugging Swallowing Screen between different healthcare professional representatives in non-stroke etiology

H. Kang (Gongju/KR), J. Kim (Seoul/KR)

Background and aims: Gugging Swallowing Screen (GUSS) is a useful bedside tool used to evaluate aspiration risk in stroke patients during the acute phase, and according to the test result, patients start their diet. The validity and interrater reliability of GUSS have been reported in previous studies. However, the interrater reliability of GUSS between different healthcare professional representatives in non-stroke etiology remains unclear thus far. This study aimed to investigate the interrater reliability of GUSS between different healthcare professional representatives in non-stroke etiology.

Methods: This was a non-blind prospective study, and the inclusion criteria included patients who had dysphagia with a non-stroke etiology. GUSS was evaluated by nurses of the

P076 Table 1. Characteristics of participants

Variable		Subject ($n=19$)
age (years)		70.05 ± 11.06
sex (%)	Male	15 (78.9)
	Female	4 (21.1)
weight (kg)		55.32 ± 9.05
height (m)		1.64 ± 0.08
onset (months)		5.8 ± 6.3
etiology n (%)	Parkinson's diseases	4 (20)
	sarcopenia	8 (40)
	Spinal cord injury	2 (10)
	COVID-19 pneumonia	2 (10)
	Other etiology	4 (20)
Diet at evaluation n (%)	Non-oral	8 (42)
	Dysphagia diet I	3 (15)
	Dysphagia diet II	3 (15)
	Dysphagia diet III	5 (28)

Values are shown as mean (%). For the statistical analysis, the Chi-square test was performed.

P076 Table 2. Sensitivity, specifity and predictive values of GUSS

	VFSS, highest score		
	Aspiration risk (PAS 5-8)	No Aspiration risk (PAS 1-4)	
GUSS results($n=19$)			
Aspiration risk (0-14)	8	4	PPV=67%
No aspiration risk (15-20)	0	7	NPV=100%
	Sensitivity =100%	Specificity=64%	

Results: In total, 10 patients were evaluated: 4 had Parkinson's disease, 2 had sarcopenia, 2 had spinal cord injury, and 2 had coronavirus disease pneumonia. Interrater reliability yielded a moderate agreement between nurses and occupational therapists (k=.577 p=.001*).

Conclusion: This study suggests the potential of using GUSS as a screening tool to evaluate dysphagia in non-stroke etiology patients. This tool can help patients start their diet earlier without an extra-complicated study. Further studies will be warranted in a larger population.
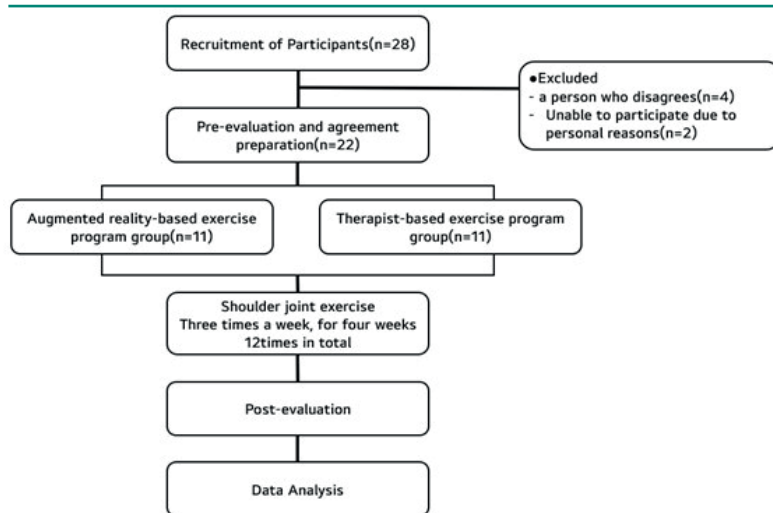
P078
Effect of augmented reality based neuromuscular training on upper extremity in sarcopania risk group

J. Yu (Asan-si/KR)

Introduction: Augmented reality is a computer graphic technology that overlays digital components as if they were in the real environment, and many studies have reported their effectiveness when applied to patients suffering neuromuscular disease for training.

Objective: In this study, augmented reality based neuromuscular training(ARNT) were provided to adult women with non-specific shoulder pain to improve the health of muscles and tendons around the shoulder. At this time, comparing ARNT to a program guided by a therapist, we want to identify if ARNT can show as much effect as the therapist's guidance on shoulder pain.

Material & method: 22 adult women with non-specific shoulder pain were included. Eleven people per group were randomly assigned to ARNT and therapist-based exercise program. Intervention was conducted 3 times a week for 4 weeks, a total of 12 times, and each exercise was repeated 3 sets of 15 times. Pre and post evaluation were conducted before and after the intervention.

P078 Fig. 1

department of rehabilitation and occupational therapists. The interval period between each test evaluation was no longer than 3 days. The GUSS score was categorized into four stages: 0–9 points, indicating severe; 10–14, indicating moderate; 15–19, indicating mild; and 20 points, indicating normal.

Results: Statistically significant results were found in before and after shoulder flexion strength in the therapist-based exercise program. There were significant differences between before and after dynamic stiffness, mechanical stress relaxation time, and creep in the ARNT(p<.05). Pain was statistically significant in all groups (p.<05).

Conclusion: The results of this study suggest that the effect of the ARNT is not significantly different from that of the therapist-based shoulder exercise program. Therefore, it is possible to recommend the use of ARNT in a situation where continuous exercise participation or motivation must be induced to the patient, or correct exercise must be performed without the supervision of a therapist.

References:
1. de Vries, J., Ischebeck, B. K., Voogt, L. P., Van Der Geest, J. N., Janssen, M., Frens, M. A., & Kleinrensink, G. J. (2015). Joint position sense error in people with neck pain: a systematic review. Manual therapy, 20(6), 736-744.
2. Nekar, D. M., Kang, H. Y., & Yu, J. H. (2022). Improvements of Physical Activity Performance and Motivation in Adult Men through Augmented Reality Approach: A Randomized Controlled Trial. Journal of Environmental and Public Health, 22.
3. Cho, H. J., & Lee, B. H. (2020). Effect of functional progressive resistance exercise on lower extremity structure, muscle tone, dynamic balance and functional ability in children with spastic cerebral palsy. Children, 7(8), 85.

P079

Effect of time from post-stroke onset to receiving swallowing rehabilitation program on the successful dysphagia recovery: a retrospective study

P. Khanittanuphong (Hat Yai, Songkhla/TH), P. Saetang (Hat Yai, Songkhla/TH), P. Vichitkunakorn (Hat Yai, Songkhla/TH), K. Soonsuwan (Hat Yai, Songkhla/TH)

Background: Many previous studies identified various risk factors for prolonged swallowing problems in stroke patients. However, few studies considered the onset of swallowing rehabilitation following a stroke. It was a possible important factor that affected the recovery of swallowing.

Objective: To study the effect of starting time in receiving a swallowing rehabilitation program after stroke onset on the successful recovery of dysphagia.

Methods: The study design was a prognostic study using retrospective data. The data of 116 post-stroke dysphagia patients with severe impairment of oral intake (Functional Oral Intake Scale, FOIS < 5) who entered swallowing rehabilitation at the Southern Medical Rehabilitation Center at Songklanagarind Hospital were included. The patients were allocated into three groups, based on the initiation of swallow therapy after stroke; a less than 30-day group, a 30-180 day group, and a greater than 180-day group. The outcome measure was successful swallow recovery with FOIS ≥ 5. Statistics were calculated by univariate and multivariate logistic regression analyses.

Results: Multivariate logistic regression analysis showed that delayed initiation of the swallow rehabilitation greater than 180 days after stroke was a predictor of failure in swallowing recovery (odds ratio [OR] = 0.21, 95% confidence interval [CI] 0.05–0.99, p = 0.048). The male was a predictor of success in swallow rehabilitation (OR = 2.61, 95% CI 1.03–6.62, p = 0.043). Moreover, females (OR = 5.33, 95% CI 1.3–21.53, p = 0.019), outpatients who were consulted from other departments (OR = 40.75, 95% CI 6.66–249.47, p < 0.001), and referral patients (OR = 13.94, 95% CI 1.47–132.3, p < 0.022) were predictors of delayed initiation of the swallow rehabilitation.

Conclusion: Starting swallow rehabilitation more than 180 days post-stroke was a negative predictor to be successful swallowing recovery. However, the male was a positive predictor. The factors that delayed swallowing rehabilitation were females, outpatients from other department consultations, and referral cases.

P080

Delay in supra-hyoid muscle activation in the patients with post-stroke dysphagia

S. J. Lee (Cheonan/KR), J. K. Hyun (Cheonan/KR), T. U. Kim (Cheonan/KR), S. Y. Kim (Cheonan/KR), J. H. Kim (Cheonan/KR), Y. H. Ryu (Cheonan/KR)

Introduction: Dysphagia is one of the common and serious complications of stroke. Dysfunction of laryngeal muscles including suprahyoid muscles is believed to be related to post-stroke dysphagia (PSD). This study aims to investigate the supra-hyoid muscle function of the PSD patients using surface electromyography (sEMG)

Objectives: To compare the sEMG of supra-hyoid muscles between the hemiplegic and intact sides in the patients with PSD.

Patients and Methods: The subjects included twelve patients who showed evident aspiration in videofluoroscopic study after unilateral cerebral infarction or hemorrhage. The sEMG signals were recorded from the supra-hyoid muscles of both sides, using a wireless sEMG analysis system (Datalite 2ch EMG system). Two recording surface electrodes were attached just below the mandible on either side of midline. Frequency bandpass was set to 20-330 Hz and smoothed by moving average filter with a window width of 200ms after rectification. Following features were measured from sEMG activity of each swallowing event: maximum and mean amplitude, duration, mean and median frequency, time to maximum peak. Collected data was compared between the hemiplegic and intact sides.

Results: Time to maximum amplitude was significantly delayed in hemiplegic side compared with intact side (1.93±1.50msec vs 1.56±1.54 msec).

Conclusion: The results demonstrate that PSD patients show delayed activation of suprahyoid muscles. Further studies are required to reveal the clinical significance of delay in suprahyoid muscle activation in PSD patients

P081

Differences in videofluoroscopic swallowing study findings and etiology regarding to age in patients with dysphagia

H. E. Yang (Seoul/KR), I. J. Choi (Seoul/KR), W. H. Choi (Seoul/KR)

Objective: The purpose of this study was to investigate characteristics of dysphagia in the oldest-old population compared with younger elderly in this country.

Methods: 418 patients (364 men, 54 women) who complain swallowing difficulty underwent videofluoroscopic swallow study (VFSS) were included in the analysis. The patients were divided into an elderly group, group I (60 – 79 years old, n=275) and the oldest-old group, group II (80 – 96 years old, n=143). Sex, cognition, duration of symptoms, penetration aspiration scale(PAS), videofluoroscopic dysphagia scale(VDS) scores, and the etiologies of dysphagia were compared between the groups.

Results: The proportion of male, Korean version of the mini-mental state examination (K-MMSE) scores(p-value<0.001), and the duration of symptoms(p-value<0.000) were significantly higher or longer in group I than in group II

The PAS and VDS scores(p-values < 0.001) were significantly higher in group II than in group I, indicating that dysphagia was more severe in group II

The proportion of central nervous system disorders was significantly higher in group I than in group II (p-value=0.039). The proportion of other disorders was significantly higher in group II than in group I (p-value=0.016). Especially, the proportion of poor general medical condition was significantly higher in group II than in group I (p-value < 0.000).

Conclusion: Dysphagia in the oldest-old was more severe and progressed faster than in the younger elderly, and in the oldest-old, the etiology of dysphagia showed a higher proportion of other diseases not directly related to dysphagia.

References

1. Wang CM, Chen JY, Chuang CC, Tseng WC, Wong AM, Pei YC (2015) Aging-related changes in swallowing, and in the coordination of swallowing and respiration determined by novel non-invasive measurement techniques. Geriatr Gerontol Int 15(6):736 – 744.
2. Aliasghari F, Izadi A, Khalili M, Farhoudi M, Ahmadiyan S, Deljavan R (2019) Impact of premorbid malnutrition and dysphagia on ischemic stroke outcome in elderly patients: a community-based study. J Am Coll Nutr 38(4):318 – 326
3. Steele CM, Grace-Martin K (2017) Reflections on clinical and statistical use of the penetration – aspiration scale. Dysphagia 32(5):601 – 616
4. Wirth R, Dziewas R, Beck AM, Clave P, Hamdy S, Heppner HJ et al (2016) Oropharyngeal dysphagia in older persons—from pathophysiology to adequate intervention: a review and summary of an international expert meeting. Clin Interv Aging 11:189 – 208.

P082

Predictors of aspiration pneumonia in alzheimer's dementia: videofluoroscopic swallowing study

J. H. Lee (Busan/KR), S. W. Kim (Busan/KR)

Background: Alzheimer's disease (AD) is a severe neurodegenerative disorder characterized by a progressive cognitive impairment and functional decline. During illness, patients may start to have difficulty in swallowing. Dysphagia leads to malnutrition, aspiration pneumonia, non-oral feeding, and death. The severity of swallowing abnormality on videofluoroscopic swallowing study (VFSS) was correlated with the severity of dementia. In AD patients, specific parameters of VFSS and clinical factors would be related to aspiration pneumonia, but it is not clear which parameter is a risk factor. Purpose of this study is to validate the risk factor of aspiration pneumonia in AD patients.

Method: We retrospectively collected the data of AD patients who underwent VFSS from January 2016 to January 2021. Total 174 patients were enrolled in this study. Patients were divided into pneumonia group (n=77), and non-pneumonia group (n=97). Pneumonia group was defined as patients who were diagnosed aspiration pneumonia within 1 month from VFSS. The VFSS results and medical records were compared between two groups.

Results: Comparing the baseline characters between two groups, there were significant difference in gender, modified rankin scale (mRS), mini-mental state examination (MMSE), peak cough flow. On the VFSS parameter, there were significant differences in residue in the oral cavity, vallecular residue, pyriform sinus residue, coating pharyngeal wall, functional dysphagia scale (FDS) score, and penetration aspiration scale (PAS) score. Among these variables, mRS, MMSE, vallecular residue, PAS score were identified as predictors of aspiration pneumonia based on logistic regression analysis.

Conclusion: Clinical factors such as mRS and MMSE are important in predicting the risk of aspiration pneumonia in AD patients. In VFSS, not only high PAS score, but also increased vallecular residue may raise the risk of aspiration pneumonia.

P082 Table 1. Comparison of VFSS parameters between two groups

	PG (n=77)	Non-PG (n=97)	p-value
Lip closure	0.13±0.80	0.05±0.50	0.433
Bolus formation	0.51±1.13	0.25±0.94	0.100
Residue in the oral cavity	0.62±1.42	0.19±0.82	0.012*
Oral transit time	1.95±2.83	1.30±2.48	0.109
Pharyngeal delayed time	2.86±4.55	1.75±3.82	0.084
Laryngeal elevation	9.50±4.90	8.04±5.67	0.074
Nasal penetration	0.77±2.15	0.45±1.72	0.269
Vallecular residue	4.52±3.57	2.35±3.15	< 0.001*
Pyriform sinus residue	3.01±3.32	0.95±2.06	< 0.001*
Coating pharyngeal wall	4.93±5.03	2.88±4.55	0.005*
Pharyngeal transit time	0.15±0.77	0.12±0.69	0.775
FDS	29.01±18.09	18.38±14.11	< 0.001*
PAS	6.67±2.48	4.91±3.06	< 0.001*

P082 Table 2. Logistic regression of the Aspiration in Alzheimer's disease

	Univariate analysis OR (95% CI)	P	Multivariate analysis OR (95% CI)	P
Age (per 1 year)	1.036(0.990-1.085)	0.125	N/A	
Male gender	2.224(1.205-4.103)	0.011*	1.841(0.728-4.658)	0.197
BMI (per 1 kg/m²)	0.996(0.909-1.092)	0.937	N/A	
mRS	3.794(2.298-6.263)	< 0.001*	2.611(1.324-5.150)	0.006*
MMSE	0.845(0.799-0.893)	< 0.001*	0.857(0.797-0.922)	0.022*
Albumin	0.884(0.463-1.691)	0.710	N/A	
PCF	0.993(0.989-0.998)	0.002*	0.997(0.991-1.003)	0.357
HTN	1.418(0.777-2.589)	0.255	N/A	
DM	0.938(0.486-1.812)	0.849	N/A	
CKD	0.353(0.094-1.329)	0.124	N/A	
Cancer	0.687(0.272-1.734)	0.427	N/A	
Heart disease	1.313(0.682-2.528)	0.416	N/A	
Lung disease	1.549(0.717-3.345)	0.265	N/A	
Residue in oral cavity	1.424(1.063-1.908)	0.018*	1.156(0.709-1.886)	0.561
Vallecular residue	1.203(1.098-1.319)	< 0.001*	1.309(1.106-1.550)	0.002*
Pyriform sinus residue	1.315(1.164-1.486)	< 0.001*	1.092(0.889-1.341)	0.403
Coating wall	1.092(1.025-1.162)	0.006*	1.093(0.941-1.269)	0.245
FDS	1.041(1.021-1.063)	< 0.001*	0.935(0.874-1.000)	0.05
PAS	1.253(1.114-1.409)	< 0.001*	1.300(1.088-1.555)	0.004*

P083

Relationship between peak cough flow and immediate effect of one-way speaking valve placement on dysphagia

J. H. Lee (Busan/KR), S. W. Kim (Busan/KR)

Background/Objectives: With the application of a one-way valve to the cannula, air flows into the lungs through the tracheostomy cannula, bypassing the pharynx. We tried to find out the difference in dysphagia improvement when one-way valve is applied according to the peak cough flow (PCF) value, which is one of the expiratory flow indicators.

P083 Table 1. PAS score according to one-way valve status

Subject	One-way valve off swallow			One-way valve on swallow			PCF (L/min)
	Spoon drinking	Straw drinking	Cup Drinking	Spoon drinking	Straw drinking	Cup drinking	
1	8	UC	UC	4	5	5	127
2	8	8	UC	8	UC	UC	74
3	8	UC	UC	5	8	UC	161
4	8	8	UC	1	6	8	134
5	6	6	6	6	6	6	82
6	5	5	5	5	5	5	110
7	8	8	8	1	1	1	295
8	8	UC	UC	8	UC	UC	129
9	6	6	6	6	6	6	95
10	5	8	8	2	5	5	139
11	5	5	5	5	5	5	83
12	8	8	UC	1	6	8	128
13	8	UC	UC	5	8	UC	148

P083 Table 2. Comparison between two groups

	Improvement group (n=7)	No improvement group (n=6)	P-value
Age	72.00±9.35	70.83±10.41	0.95
Tracheostomy duration	40.57±17.78	29.00±3.16	0.18
FDS	7.43±5.42	10.00±9.45	0.73
PCF	161.72±55.52	95.50±18.8	0.01*

Design: Prospective study
Setting: Conducted from April 2021 to December 2021
Participants: Enrolled patients who have tracheostomy.
Interventions: Video fluoroscopic swallowing study was consisted of a total two sessions. All patients underwent a first session before one-way valve application. After initial session, patients cleared residue and penetration & aspiration materials, and then applied one-way valve on tracheostomy tube (T tube).
Main Outcome Measure: After applying one-way valve on T tube, we measured PCF. After measuring PCF, we examined second session. And then, radiologic review was performed. Before and after one-way valve apply, PCF, penetration-aspiration scale (PAS, 1~8) and functional dysphagia scale (FDS) were measured.
Results: Total thirteen patients were recruited. Seven patients improved with aspiration after one-way valve apply, and six patients had no change before and after one-way valve apply. When compared between two groups, there were no difference at age, tracheostomy duration and FDS. However, the improvement group showed a statistically significantly higher PCF value than the no improvement group.
Conclusion: In patients with high PCF, one-way valves can be actively applied to improve swallowing function. Further studies should be needed to find the applicable PCF cut-off value.

P084

Effect of oral neuromuscular training on tracheostomy tube decannulation in patients with acquired brain injury: a pilot randomised controlled trial

J. Fabricius (Hammel/DK), M. Blichfeldt (Hammel/DK), M. Kothari (Hammel/DK)

Background: Neuromuscular training with an oral screen is used clinically for training swallowing function and mouth closure in patients with acquired brain injury. However, use is based on best practice, since there is a lack of studies which have investigated the effect in clinical trials.
Objectives: To investigate the effect of oral neuromuscular training on tracheostomy decannulation and swallowing function in patients with acquired brain injury.
Method: A pilot randomised controlled trial (ClinicalTrials.gov: NCT05235282, Protocol ID: 764706). A total of 26 subjects with trachestomy tubes due to acquired brain injury will be included in either the intervention- or control group. The intervention group will receive training three times a day monday-friday with an IQoro oral screen over a period of three weeks as an addition to usual practice. The control group will receive usual practice in dysphagia and trachestomy tube decannulation management. Inclusion criteria: Acquired brain injury, age >=18 years, cuffed tracheostomy tube at admission for rehabilitation, Fiberoptic Endoscopic Dysphagia Severity Scale - DK (FEDSS-DK)>=4. Outcomes: Primary outcome is timed until decannulation of the tracheostomy tube. Secondary outcomes are swallowing function assessed with Fiberoptic Endoscopic Evaluation of swallowing (FEES) using the scales Penetration Aspiration Score-DK (PAS-DK), FEDSS-DK, Yale Pharyngeal Residue Scale-DK (Yale-DK), along with daily amout of secretion above the cuff.
Results: The study has so far included 15 of 26 subjects. Data collcetion is anticipated to last until august-october.

P085

Review of PEG tube placement practice in Hyper-acute Neurological Rehabilitation Unit (HARU) in comparison to national guidelines

Z. Masood (Manchester/GB), L. Cheng (Manchester/GB), M. Negm (Manchester/GB)

Background: Patients in HARU have complex rehabilitation needs, requiring long term nutritional support. Prolonged nasogastric tube (NGT) has its complications and timely PEG placement may avoid these.
**Quality Issues:** Prolonged NGT is associated with multiple complications such as discomfort, nose bleeds and pressure ulcers. Recurrent placement of dislodged NGT is frequently seen in agitated patients in HARU increases the risk of wrong site placement.
Standards/guidelines: Our audit was performed with reference to the NICE CG32 and BAPEN guidelines, which recommends the placement of gastrostomy for patients needing long-term (>4 weeks) enteral tube feeding.
Methods: We collected the data by retrospectively reviewing our electronic patient records for all patients admitted to our HARU from 1/5/2021 to 31/5/2022. Patients who already had a gastrostomy on admission to HARU, or had no nutritional
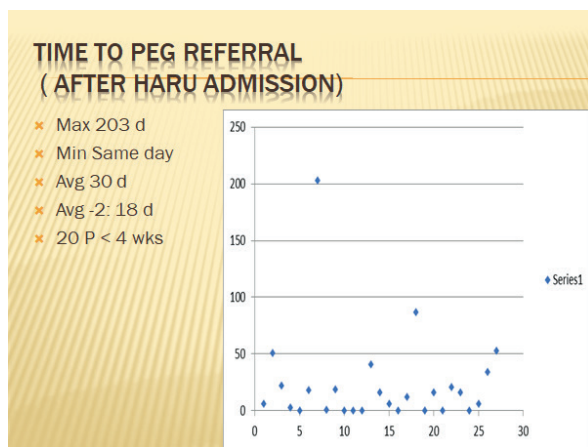
P085 Fig. 1
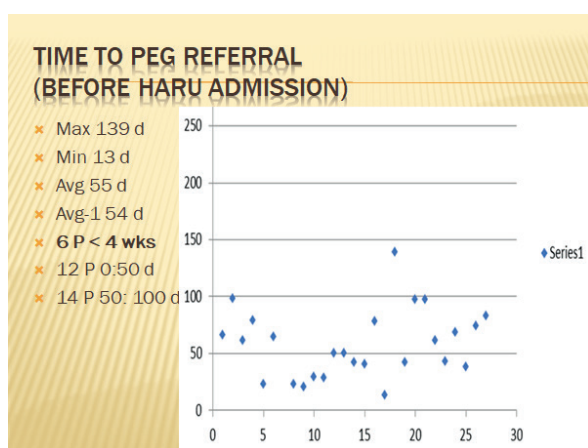
P085 Fig. 2

concerns were excluded. Out of 325 patients, 27 patients met our inclusion criteria.

Results: The mean number of days from admission to HARU to gastrostomy referral was 30 days (min=0; max=203), in comparison to 55 days (min=13; max 139) from admission to hospital to gastrostomy referral in other units.

Changes implemented: The audit showed that we were meeting the recommended national guidelines for consideration and referral for placement of gastrostomy for patients needing long term enteral feeding. It highlighted the importance of assessing the nutritional status of the patient on admission to HARU.

Closing the loop: The results will be shared with the neuroscience centre clinical governance meeting, for earlier consideration of gastrostomy and will be re-audited at a later stage.

P086

Successful decannulation due to pharyngeal electrical stimulation in a patient with severe dysphagia after subarachnoid hemorrhage

C. Weichert (Duesseldorf/DE), S. Schramm (Duesseldorf/DE), A. Schönfeld (Duesseldorf/DE), M. Göppert (Duesseldorf/DE)

Multifactorial dysphagia due to acute neurological disorders and post-extubation dysphagia impacts patients' quality of life and is one of the most important assessed symptoms during (early) rehabilitation. Before, the only approach to

treating dysphagia was speech therapy training. Nowadays, there is evidence, that pharyngeal electrical stimulation (PES) is an effective technique that can enhance the reorganization of the swallowing-related motor cortex. There are also reports about using prolonged protocols and application to different causes for dysphagia. We present a case of a 57-year-old woman who developed severe multifactorial dysphagia after subarachnoid hemorrhage caused by a PICA-aneurysm with transient elevated intracranial pressure on the one hand- and post-extubation dysphagia after intensive care treatment including mechanical ventilation- on the other hand. For airway protection, there was performed tracheotomy. When the patient presented in our clinic for early neurorehabilitation logopedic testing showed reduced coordination of tongue movements, wet voice, delayed swallowing reflex trigger, oral saliva retention and dysfunction of sensitivity. Swallowing frequency was reduced. Handling of saliva was insufficient and endotracheal suctioning had to be performed frequently. A fiberoptic endoscopic evaluation of swallowing examination (FEES) showed constantly saliva accumulation in the laryngeal vestibule (Murray Secretion Scale, Murray 3). Moreover, there was aspiration without removal from the airway (Penetration Aspiration Scale, PAS 7) of saliva, water and ice chips. On top of that, there were seen massive pharyngeal residues (Yale Pharyngeal Residue Severity Rating Scale, Yale IV,V). Modified Evans blue testing was positive. As the patient was tube-dependent with no oral intake, she had a Munich Swallowing Score (MUCSS) of 12 (4+8). She received standard logopedic training and was treated medically with scopolamine, oral ipratropium

P086 Fig. 1a) Intensity of PES stimulation over time decreases
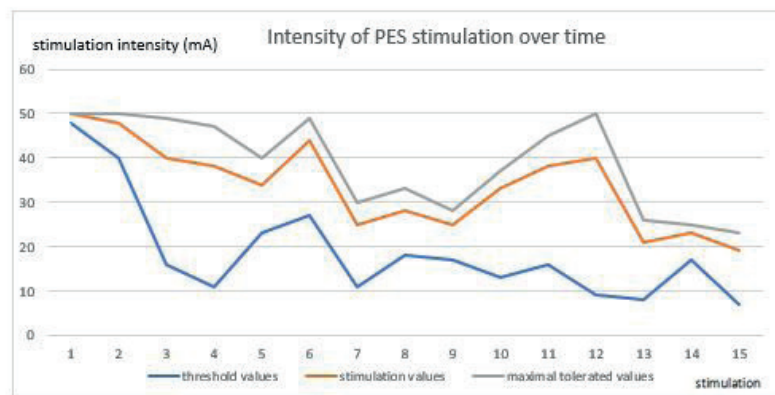
P086 Fig. 1b) Swallowing frequency in resting state and during stimulation over time increases
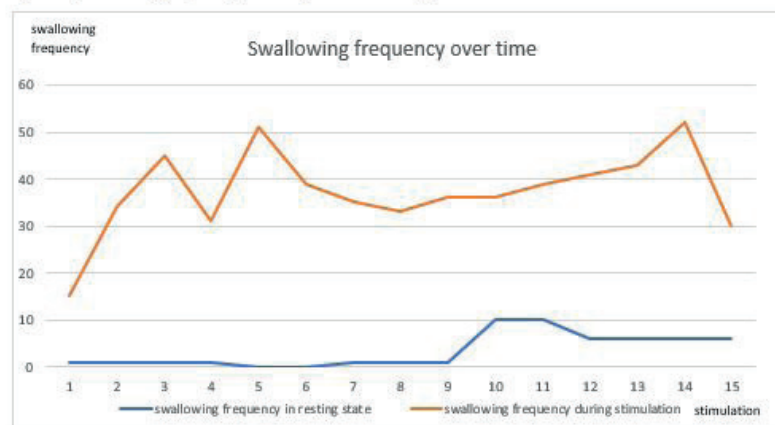
P086 Table 1. Development of tests and scores during stimulation

Test	Day 55 after subarachnoid hemorrhage	Day 69 after subarachnoid hemorrhage	Day 76 after subarachnoid hemorrhage	Day 83 after subarachnoid hemorrhage	Day 90 after subarachnoid hemorrhage
FEES	aspiration of saliva, massive pooling; cannula not cuffed;	aspiration of saliva and water, reduced sensitivity; cannula not cuffed;	aspiration of saliva, water, no aspiration of yoghurt+bread; less residues cannula with occlusion cap;	aspiration of saliva, water; no aspiration yoghurt+bread; improved sensitivity; few residues	minimal aspiration of saliva, penetration of water, no A/P for purée+bread; few residues; puréed food and water 1:1
	no oral food/drink intake	lavage water protocol	purrée in therapeutic setting	puréed food and water 1:1	
PAS	7 (saliva, water and ice chip)	8 (saliva, water, purée)	7 (saliva, water), 2 (yoghurt), 1 (bread)	8 (saliva), 7 (water), 1 (purrée+bread)	8 (saliva, minimally), 2 (water), 1 (purée and bread)
Murray	3	3	2	2	1
MUCSS-S, MUCSS-N, MUCSS total	4+8=12	4+7=11	4+7=11	4+7=11	4+6=10
Swallowing frequency in resting state	2/min.	0/min.	1/min.	5/min.	2/Min.
	before 1st cycle of PES	after 1st cycle of PES	after 2nd cycle of PES	after 3rd cycle of PES	after 4th cycle of PES
Modified Evan's blue dye test	positive	positive	positive		positive (minimally)

PAS: penetration aspiration scale, MUCSS: munich swallowing score; A/P: Aspiration/penetration

bromid spray and with botulinum toxin in the parotid gland. Despite these measures the initial swallowing training stagnated after 6 weeks of rehabilitation, so PES was tried. Stimulation intensity decreased over time with swallowing frequency in resting time and during stimulation increasing (figure 1a+b). FEES after PES treatment could objectify clinical improvement of sensitivity and saliva handling (Murray 1). There remained slight aspiration of saliva with Evans blue testing still minimally positive (PAS 8 for saliva). Swallowing water, puree and bread improved (PAS 2 for water, PAS 1 for purée and bread) and residues were significantly reduced (Yale I+II). MUCSS was now 10 (4+6). Overall, especially sensitivity improved drastically, so that our patient could successfully be decannulated and discharged home with puréed food and water. As a result, in this case we show effectiveness of PES in multifactorial dysphagia with combined impact of acute cerebral hemorrhage and post-extubation.

P087

Applying 3D printing to anatomy education for laryngeal electromyography and botulinum toxin injection procedures

M. W. Kim (Incheon/KR)

Background: The muscles of the larynx, such as the cricothyroid muscle, thyroarytenoid muscle, and cricopharyngeus muscle, are crucial for the diagnosis and treatment of patients with laryngeal disorders. These muscles are small in size and are surrounded by important blood vessels and nerves, making them difficult to access. When performing laryngeal electromyography to determine the cause of vocal cord paralysis, it is essential to include the cricothyroid muscle and thyroarytenoid muscle. If the cause of dysphagia is due to dysfunction of the upper esophageal sphincter, the cricopharyngeus muscle requires botulinum toxin injection. Practicing needle electromyography and injection procedures using anatomical models can greatly enhance proficiency in these techniques, providing significant assistance during actual procedures in a clinical setting. However, currently available anatomical models do not accurately represent the aforementioned muscles in detail, and it is uncertain whether their sizes are true to life or if they have been enlarged for production purposes, potentially compromising overall accuracy.

Objective: We aim to create design blueprints for 3D printing of the laryngeal region, specifically focusing on the cricothyroid muscle, thyroarytenoid muscle, and cricopharyngeus muscle, using actual human MRI or CT data. The goal is to produce an anatomical model of the laryngeal muscles using 3D printing technology. This model can be utilized for educational purposes in training for needle electromyography and botulinum toxin injection procedures.

Method and Results:

P088

Assessment of swallowing in progressive supranuclear palsy – an Indian cross-sectional study

M. Sengupta (Kolkata/IN), H. Kumar (Kolkata/IN)

Introduction/Background: Progressive supranuclear palsy (PSP) is a progressive neurodegenerative disease, a taupathy, and the most common Parkinson-Plus syndrome. It is characterized by early falls, vertical supranuclear gaze palsy, dysexecutive syndrome, and axial rigidity. Oropharyngeal dysphagia is also a well-documented symptom of PSP and is commonly noted 3 – 4 years after disease onset. Fiberoptic endoscopic evaluation of swallowing (FEES) is a valuable tool for an objective evaluation of neurogenic dysphagia.

Objective: This cross sectional study attempts to assess the nature of swallowing impairment in patients with PSP. It also evaluates the relationship between swallowing impairment and the degree of cognitive impairment.

Materials and Methods: 30 patients of PSP (possible and probable) were included from the movement disorder clinic of the Neurology department of a tertiary care hospital of Neurosciences in Eastern India. The history, clinical features, sociodemographic characteristics, PSP rating scale scores, and the Montreal cognitive assessment (MOCA) scores were recorded for each. FEES was done for each patient by the same physician in the off phase after 12 hours of withdrawal of antiparkinsonian drugs. During FEES, a trial of liquid, semi-solid and solid bolus was given. Swallowing parameters like secretions, spillage, penetration aspiration, residues, cough reflex, and swallowing reflex were recorded. Cognitive impairment was classified as none, mild, moderate, and severe.

Discussion and Results: swallowing assessment in PSP in often an overlooked area. Early clinical suspicion and interventions including rehabilitation should be started at the earliest. The study is ongoing. Results will be tabulated in an excel sheet and data will be statistically analyzed using R software.

Keywords: Progressive supranuclear palsy, Fiberoptic endoscopic evaluation of swallowing, dysphagia

P089

Swallowing in patients with SMA – new findings in DYS-SMA trial

S. Hamzic (Giessen/DE), A. Hahn (Giessen/DE), M. Juenemann (Giessen/DE), M. Butz (Giessen/DE), J. Wagner-Doerr (Giessen/DE), H. Kraemer-Best (Giessen/DE)

Background and aims: Spinal muscular atrophy (SMA) is a progressive autosomal-recessive neuromuscular disease characterized by premature degeneration of the 2nd motor neuron and a broad phenotype. Although the new therapies with Nusinersen, Onasemnogene abeparvovec and Risdiplam improve the prognosis of SMA, the treatment of clinical symptoms remain challenging. The clinical hallmarks of SMA are progressive muscle weakness and muscular atrophy. Bulbar muscle weakness including dysphagia represent an important diagnostic and therapeutic challenge and an important factor of morbidity in SMA. Adequate diagnosis and care of this symptom are essential to maintain a good quality of life.

Only a few retrospective studies with small numbers of patients or case reports dealing with dysphagia in SMA are on record, no standardized swallowing assessments have been applied. No larger study has systematically analyzed which percentages of SMA 1, 2, and 3 patients suffer from dysphagia, no data are available about severity of dysphagia in the single types.

The aim of the DYS-SMA trial (ClinicalTrials.gov Identifier: NCT04773470) is to implement Flexible Endoscopic Evaluation of Swallowing (FEES) and standardized FEES-scores in the diagnostic work-up of dysphagia in 70 SMA 1, 2, and 3 patients. This study will pave the road for a multi-centre trial to evaluate the effects of the different therapeutic agents on bulbar function in SMA using FEES and dysphagia scores. The FEES algorithm introduced in this trial will help to determine symptoms related to dysphagia and their severity in SMA.

Methods: FEES will quantify dysphagia severity displayed via standardized FEES algorithm. Total FEES score is correlated with SMA severity, motor function scores and with pulmonary function as external factors at the 1st and 2nd measure time point to determine the association with external measures related with dysphagia. We will determine the total FEES score at the first measurement time point is associated with SMA severity, pulmonary function, and occurrence of pneumonia during the follow-up four months after the first visit.

Results: Of planned 70 patients we have included 31 and reevaluated 15 patients. Due the small number of recruited and reevaluated patients merely a quantitavie analysis for pharyngeal residue was conducted. We found a considerable amount of pharyngeal residue of all tested consistencies as well as for pharyngeall secretions. In most cases the Yale Pharyngeal Residue Severity Rating Scale (YS) for Valleculae and Piriform sinus ranged from 4 (moderate) to 5 (severe) with postdeglutitive penetration and silent aspiration of residue.

Conclusion: The current data confirm our hypothesis of frequent dysphagia symptoms in patients suffering SMA. The symptoms of moderate to severe residue in Valleculae and Piriforms sinus may be caused by muscular weakness of lingual, laryngeal and supra-hyoidal structures.

P090

Compensatory mechanisms in the management of dysphagia in Amyotrophic Lateral Sclerosis (ALS)

A. S Y (Bengaluru/IN), Y. Belur Keshavaprasad (Bengaluru/IN), P. Treesa Thomas (Bengaluru/IN), S. Vengalil (Bengaluru/IN), S. Nashi (Bengaluru/IN), K. Madassu (Bengaluru/IN), G. S. Kumar (Bengaluru/IN), A. Marath (Bengaluru/IN), S. B. Sanka (Bengaluru/IN), N. Atchayaram (Bengaluru/IN)

Introduction: Persons with ALS (PALS) have an increased risk of aspiration, dehydration, weight loss, and malnutrition which is caused by the degeneration of bulbar motor neurons (Ertekin et al., 2000). As a result, there is a need for aggressive management to improve the quality of life as well as survival (Brent et al., 2020) in the absence of curative treatment for ALS (Majmudar et al., 2014).

Objectives: The aim of the study was to elucidate the compensatory mechanisms and its components in the management of dysphagia in PALS.

Method: Participants were 10 PALS (Male and Female,5SO,5BO). The Mean (Standard deviation, SD) age of the PALS with Spinal onset (SO) and Bulbar onset (BO) were 49.4(10.13) and 56.6(10.46) years respectively. All participants underwent Clinical Swallowing Assessment and were diagnosed to have neurogenic dysphagia. Compensatory mechanisms for the management of neurogenic dysphagia under five categories namely i.e. Postural strategies (Body and Pharyngeal posturing), Bolus control techniques (rate of intake and placement), Diet modification and Prosthetics (Huckabee,1994), as well as modified Voluntary protection airway, were chosen. Demonstrations on dysphagia management were provided to each participant.

Results: Mean (SD) of the duration of onset of the first symptom in SO and BO PALS were 8.5(3.82) and 10.6(2.8) months respectively. The Mean (SD) of the dysphagia symptoms in SO and BO PALS was 2.9(0.91) and 5.43(0.87) months respectively. All compensatory mechanisms except for prosthetics were recommended for PALS. The findings were also in accordance with the fact that compensatory components like upright posture, chin tuck, small sips of intake, no talking while eating are helpful in reducing the risk for aspiration, as there is no rehabilitative regimen to restore the physiologic swallowing function in PALS (Majmudar et al., 2014). Additionally, the chin tuck posture has been identified as one of the safe components, which was confirmed under videofluoroscopy in PALS as it narrows the tongue base and prevents food entry into the larynx (Solazzo, 2012).

Among the compensatory components, body posturing, bolus intake rate, and modified voluntary protection of the airway were recommended for all the PALS. In addition, components such as pharyngeal posturing, bolus placement, more dry swallows, and diet modification were also recommended for only BO ALS. Thus, additional components were advised to the BO PALS, due to more severe dysphagia symptoms compared to SO PALS. Studies have shown that BO ALS progresses fast and has a worse prognosis (Lee et al., 1995; Louwerse et al.,1997; Traynor et al., 2000) compared to the SO.

Conclusion: Timely management of dysphagia using compensatory mechanisms is crucial to both Spinal onset and Bulbar onset ALS to reduce the risk of aspiration. This study also recommends individual specific compensatory components based on the dysphagia symptoms.

P091

Early onset of neurological heterotopic ossification: a case-report

H. Ardaillon (Lyon/FR), J. Paquereau (Garches/FR)

Neurogenic heterotopic ossification (NHO) is defined as the formation after a severe neurologic trauma of endochondral bone within soft tissue or muscle, affecting mainly large joints. HO is a common debilitating condition in neurological injured patients as it elicits pain, restricts range of motion, and impairs functions such as sitting or walking. HO still remains underdiagnosed, thus the exact time between injury and clinical suspicion is unclear. HO usually occurs between 2 weeks and 3 months after injury, but earlier onset has never been reported.

We report herein the case of a 21-year-old male with no prior history, who had a car accident. On arrival at the trauma centre, a computed tomography (CT) scan revealed a severe head injury, abdominal trauma, and right femur shaft fracture with intramuscular hematoma. He was admitted to the neurological post-intensive care rehabilitation unit (PICRU) on day 9 after the accident. He was conscious, in post-traumatic amnesia, with no motor deficit. On the day of admission, he reported pain in his right leg, presented with swelling and warmth of his right thigh (+8cm compared to left side), and restricted range of motion of the right hip. Blood samples showed a biological inflammatory syndrome. Acetaminophen and morphine were administered with moderate relief of pain. A new interpretation on the CT-scan performed in ICU on day 5 described a calcification of gluteus medius muscle, distinct from the initial fracture hematoma (Figure 1). A magnetic resonance imagery (MRI) performed on day 16 after trauma showed a heterogeneous heterotopic ossification (73mm/40mm/80mm) and was located in the fatty intramuscular space of the right gluteus medius. Ketoprofen was administered from day 20 to 27, allowing a complete relief of pain and of swelling (+1cm compared to left side). On day 25 after trauma, hip mobilisation was painless with normal range of motion. Blood samples showed normalisation of biological inflammatory syndrome. CT-scan performed on day 38 showed a moderate increase in ossification size. On day 43 after trauma, he was discharged from the PICRU and continued rehabilitation.

To the best of our knowledge, onset of HO has never been described this early after an injury. Clinical suspicion of HO (autonomic dysfunction, local inflammatory signs, pain, or reduced joint range of motion) is usually made 6 weeks after admission to ICU. In our patient, the location of the HO was typical of brain-injured patient (affecting more frequently the posterso-lateral zone to the hip in traumatic brain-injury. After a systematic screening, HO is present in up to 20-30**%** of patients in rehabilitation departments. HO is frequent after

bone, brain, or spinal cord injury but remains a diagnostic as well as a therapeutic challenge. Identifying patients at an earlier stage of HO development to start an early treatment would increase care efficiency and pain management.

P091 Fig. 1

P092

Odontoid peg fracture in older adult

P. Deshpande (York/GB, Hull/GB)

A 72y-old cyclist's admitted after a head on collusion with a car.He had extradural haematoma, orbital emphysema, facial bone fractures and odontoid peg fracture. He had no neurological weakness and the fracture was managed with hard cervical collar.After 8 weeks it showed fibrous band due to malunion. He improved with neurological rehabilitation and was able to walk with a frame.

References:

1. Paul C Ivancic. Odontoid fracture biomechanics. Spine (Phila Pa 1976). 2014
2. M Venkatesan et al. Survival analysis of elderly patients with a fracture of the odontoid peg. Bone Joint J. 2014

P093

Is the use of FES-Cycling in patients with complete spinal cord injury in the acute phase recommended? Two cost-utility analyzes comparing the rehabilitation through passive mobilization versus FES

M. Olivieri (Lucca/IT), G. Del Popolo (Florence/IT), R. Di Stefano (Pisa/IT), G. Stampacchia (Pisa/IT)

Introduction: The primary aim of rehabilitation protocols for patients affected by acute complete Spinal Cord Injury (SCI) is the recovery of trunk and upper limb functions. The intervention time dedicated to lower limbs is always short and normally includes passive mobilization. Nonetheless, lower limb immobilization could lead to secondary complications: muscle atrophy and tone alterations, bone atrophy, blood stasis etc. Functional Electrical Stimulation (FES) in persons affected by acute complete SCI could reduce immobilization's negative effects. FES is

not commonly practiced in acute inpatients for several reasons, including FES devices costs; yet, cost-utility analyzes addressing this issue are still scarce and normally aimed to evaluate FES used as orthosis.

Objective: The aim of this study is to verify the cost-effectiveness of a FES-Cycling (FES- C) rehabilitation protocol in patients affected by acute complete SCI.

Patients and Methods: Twenty patients affected by acute complete SCI were recruited from Pisa Spinal Unit (PSU) and Florence Spinal Unit (FSU). The participants followed 20 sessions (30 minutes each) of lower limbs rehabilitation three times per week. PSU recruited the Experimental Group (EG): FES-C; FSU recruited the Control Group (CG): passive manual mobilization. Thigh volume, Modified Ashworth Scale (MAS) and International Spinal Cord Injury – Pain Basic Data Set (ISCIPBDS) were performed. The measures were collected at: T0 (baseline), T1 (end of the intervention) and T2 (6 months follow-up). Quality Adjusted Life Years (QALYs) was obtained from the clinical outcomes; costs were calculated by the hospital competent offices. Finally, two Incremental Cost-Utility Ratio (ICUR) were determined: ICUR-1 (T0-T1) and ICUR-2 (T0-T2).
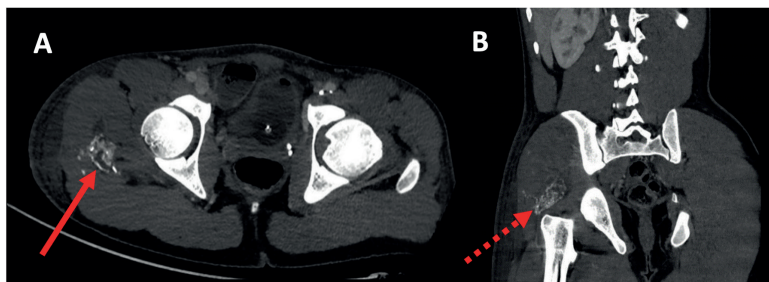
Results: All participants completed the study. QALYs of EG were: 0.11 (T0-T1) and 0.37 (and T0-T2). QALYs of CG were: 0.06 (T0-T1) and 0.23 (T0-T2) **(Fig. 1)**. Costs' difference (EG-CG) was 529.20 €. Finally, ICUR-1 was 10'584 €/QALYs; ICUR-2 was 3'780 €/QALYs **(Fig. 2)**.

Discussion and Conclusion: This was the first study developing a new algorithm based on possible clinical benefits to execute cost-utility analysis of a FES-C rehabilitation protocol in patients with acute complete SCI. Both interventions reported an increase in QALYs. FES-C utilities were greater than those of the standard protocol, although the costs were also greater. Nonetheless, this increment was in favor of FES-C, both after the intervention than at the follow-up. This result was mainly due to thigh girth which increased after the FES-C intervention and was stable at the follow-up. The results of the passive leg movements, the thigh girth circumferences reduced both after the training period and at the FU.

FES-C seems to be more cost-effective than conventional rehabilitation. The cost-utility algorithm proposed can be easily performed for different rehabilitation protocols.

P093 Fig. 1. *Percentages of change in thigh measurements.* Percentages of thigh change (%) of EG (n=10) (above zero) and CG (n=10) (below zero). Results of measurements above the patella at: 10 cm (light gray), 20 cm (dark gray). Percentages of change after the treatment (1st-4th columns), at the FU (5th-8th columns). (*) difference between the measurements significant (p<0.05). Legend: [---] Cut-off value of muscle trophism after FES intervention based on literature on complete SCI. [----] Cut-off value of muscle atrophy after short-term immobilization [-----] and long-term immobilization based on literature on complete SCI.

P094

Effects of robotic verticalization on intracranial pressure in early neurorehabilitation

S. Maffia (Como/IT), A. Zarucchi (Como/IT), I. Zivi (Como/IT), R. Valsecchi (Como/IT), G. Albani (Como/IT)

One of the fundamental phases in the early rehabilitation of the severely brain-injured in intensive care. is in fact represented by the verticalization both for the richness of sensory information and because it favors a better cerebrospinal fluid circulation compared to the supine position.

In this study, we used Erigo®, a tilt table equipped with a robotic device capable of determining a passive stepping movement of the lower limbs, which by preventing venous stasis reduces orthostatic hypotensive reactions.

Aim of this study instead is the evaluation of Erigo on intracranial pressure, a fundamental parameter for the evaluation of cerebral perfusion and therefore of the physiopathological integrity of the circulation,

All patients consecutively admitted to our intensive care unit following a traumatic/vascular event and carrying a PIC catheter were evaluated (total 15 patients Erigo group/15 patients control group)

The PIC, PPC and PAM values are recorded at the following times: 0° pre-verticalization (T0), start of the stepping movement at 0° (T1), 20° verticalization (T2), 40° verticalization (T3) , verticalization at 60° (T4), verticalization at 70° (T5), recumbent position 0° post-verticalization (T6), recumbent position 0° 10 minutes post-verticalization (T7).

The enrolled patients (Erigo Group) underwent 3 sessions per week (30 min/day) of verticalization using Erigo and 2 sessions per week (30 min/day) of conventional physiotherapy, until the moment of removal of the PIC. The control group followed 5 sessions per week of conventional therapy. All patients stopped sedation an average of 5 days before the start of physiotherapy. The PIC catheter in the Erigo group was removed on average 7 days earlier than in the group of patients who did not perform Erigo (mean 12 g – mean 19 g). Baseline MAP averaged 90 mmHg and remained constant throughout the session with a minimal increase at 40° (MAP= 94.5 mmHg). The comparison of the mean

P093 Fig. 2. *ICUR graphic.* The interpretation of the ICUR value is supported by a Cartesian plane. The ICUR can be postioned in four different quadrants: cost-effectiveness (first quadrant), dominated (second quadrant), doubtful (third quadrant), dominant (fourth quadrant). If the ICUR values falls within the cost-effectiveness quadrant, a predetermined threshold is used: if the ICUR is lower than the threshold the treatment can be definded as cost-effective. In this study the National Institute for Health and Care Excellence threshold of the United Kingdom of 22.000/33.000 €/QALYs was applied [continuous line in the figure]. The ICUR-I and ICUR-2 are both postioned in the first quadrant and under the chosen threshold.

values of PIC before and after verticalization with Erigo recorded a significant decrease (p=0.001) and this decrease was maintained throughout the day of treatment and on consecutive days. The PPC remained stable between 0 and 30° while it recorded an increase at 40° of verticalization against lower PIC values. On the other hand, the group that performed conventional physiotherapy did not record significant changes in ICP during mobilization, always maintaining higher constant values than the other group.

Early verticalization with Erigo in patients with acute GCLA allows a reduction of PIC values with constant PPC values greater than treatment with conventional physiotherapy without the occurrence of adverse events during treatment. Patients treated with Erigo recorded lower PIC values which were also maintained in the days following treatment: this led to faster weaning from external ventricular shunt.

P095

Challenge or opportunity: Rehabilitationoutcomes in patients with metastatic spinal cordcompression – a UK single center experience

F. Magni (Aylesbury/GB), G. Lafeuillee (London/GB), M. Desai (London/GB), S. Knight (London/GB)

Context/Objective: Metastatic Spinal Cord Compression (MSCC) is a devastating complication of cancer, affecting approximately 3000 patients per annum in England. However, access to rehabilitation services for MSCC patients is limited. The London Spinal Cord Injury Centre has set up a bespoke MSCC rehabilitation pathway from May 2013. This article aims to describe the clinical features and functional outcomes of patients with MSCC admitted to a Specialist Spinal Cord Injury Rehabilitation Centre between May 2013 andDecember 2021.

Design: Retrospective analysis of medical records from a single specialist rehabilitation centre database.

Setting: London Spinal Cord Injury Centre (LSCIC), Stanmore, United Kingdom.

Participants: Adult patients diagnosed with MSCC who were admitted to and discharged from LSCIC from May 2013 to December 2021.

Interventions: Specialist Inpatient Spinal Cord Injury Rehabilitation Program.

Outcome Measures: Spinal Cord Independence Measure 19 (SCIM version III), Discharge Destination.

Results: A total of 40 patients with MSCC were admitted – 32 male and 8 female patients. The average length of stay was

P095 Fig. 1. Graph showing comparison of SCIM subscores from admission to discharge

6 weeks. 17 (42.5**%**) patients had primary prostate cancer. Most patients (34(85**%**)) had thoracic MSCC. There was an improvement in the Spinal Cord Independence Measure in all patients with an average significant improvement from 43.8 to 64.5 (P<0.001). There was no significant difference in SCIM scores between patients under 65 and over 65. 28 (70**%**) patients required psychological input. 33(82.5**%**) patients were discharged home.

Conclusion: Patients with MSCC show improvement in SCIM outcome measures after a six-week inpatientSpecialist Spinal Rehabilitation program.

P096

Eye tracking technology use in early rehabilitation patients and patients with minimally conscious state

M. Klaehn (Meerbusch/DE)

Background:
Modern day communication is dominated by electronic devices. Also people with complex disabilities use electronic communication devices more and more. While people with locked in syndrome or ALS have been using eye-controlled devices for quite some time – in early rehabilitation gaze controlled computers are rarely used.

Objective: Eye tracking technology gives the therapist the opportunity to assess minimal conscious patients or patients with inability to speak and severe motor disorders without having to give complex instructions and without having to rely on motor functiones except for eye movements. With some experience this is a good bedside tool to get information on the ability to find, fixate and follow objects, basic ideas about visual field defects or visual neglect, training or testing basic "if – then" relationships and also higher neuro-cognitive functions, since the only motor functions involved are eye movements.

Methods: The attractiveness of electronic media especially for younger patients, the possibility to use clients personal photos etc. and the principle of self-efficacy ("I look at something and make something happen") are used to increase the patients motivation and attention span. So far there exist rarely any programs specially designed for early rehabilitation patient´s needs. These are good visibility if the patients ability to focus and track objects is not known, reduced complexity of content to avoid crowding and to create success without needing to much accuracy in visual pursuit or in case of a squint.

Results: Existing software programs with customisable software thave been developed to assess patients in early reha-
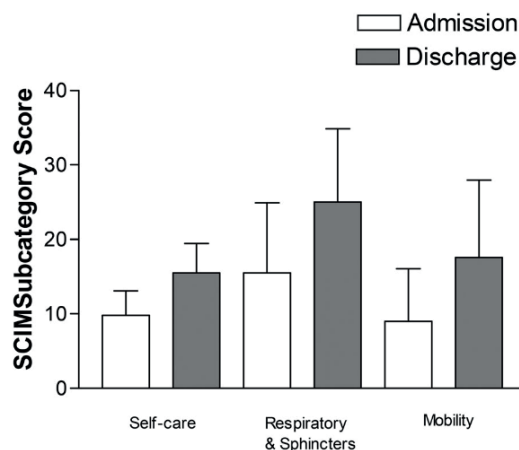
P095 Table 1: Overall Spinal Cord Independence Measure (SCIM) outcome scores at admission and discharge (n=40)

	N=	Admission Mean ± SD (95% CIs)	Discharge Mean (95% CIs)	Mean difference	95% CIs*	T	P value 2-tailed
Total SCIM score	37	43.8 ± 21.5 (36.6, 51.0)	64.5 ± 19.8 (57.9, 71.1)	20.7 ± 14.1	16.0, 25.4	8.893	<0.0001***
Subcategories: Self-Care	10	9.8 ± 3.3 (7.4, 12.2)	15.5 ± 4.0 (12.7, 18.4)	85.7 ± 4.3	2.6, 8.8	4.17	0.0024***
Respiratory and Sphincter Management	10	15.5 ± 9.4 (8.8, 22.2)	25.0 ± 9.8 (18.0, 32.0)	9.5 ± 9.8	2.5, 16.5	3.055	0.0137*
Mobility	10	9.0 ± 7.1 (3.9, 14.1)	17.6 ± 10.4 (10.2, 25.0)	8.6 ± 5.3	4.8, 12.4	5.135	0.0006***

bilitation with reduced motor and cognitive ability. Here algorithms on how to assess patients and examples of work will be presented.

P097

Detecting the unique contribution and impact of fibreoptic endoscopic evaluation of swallowing (FEES) for patients with neuro specific conditions in a tertiary hospital setting

D. Brown (London/GB), Z. Garstang (London/GB)

Background: FEES is a well evidence based evaluation to assess dysphagia. The positive impact on patient outcomes, such as earlier return to oral intake or tracheostomy weaning, means that FEES should be considered an essential tool available to all SLT dysphagia services. (RCSLT Position Paper 2020). FEES has been used at King's College Hospital for more than ten years, however its unique contribution to outstanding patient care has not previously been explored at this NHS Trust. This project was initiated to provide information on the unique contribution and impact of FEES in a tertiary hospital setting.

Objective: To provide information on the unique contribution and impact of FEES for patients with neuro specific conditions in a tertiary hospital setting.

Methods: Retrospective data over 1 year for inpatients referred for FEES Jan 2022-Jan 2023

Data gathered: demographics and FEES outcomes

Formal outcome measures used:

- New Zealand Secretion Rating Scale (Miles et al 2017)
- Penetration Aspiration Scale (Rosenbeck et al 1996)
- The Yale Pharyngeal Residue Severity Rating Scale Neubauer et al 2015)

Findings:

72 patients referred, 62 patients completed FEES, 36**%** with tracheostomy

52**%** sensorimotor dysphagia, 48**%** motor

43**%** progressed oral intake, 4**%** reduced

26**%** silent aspiration

25**%** provided swallowing rehabilitation advice

36**%** trache weaning guided

36**%** referred to ENT 15**%** referred for follow-up elsewhere 1

7**%** reflux identified

1 patient went on to develop an aspiration pneumonia post-FEES

Conclusions: FEES supports timely return to oral intake and progression of recommendations pertaining to dysphagia. Provision of targeted swallowing rehabilitation improved patient outcomes proven by the very small number of patients who went on to develop aspiration pneumonia post-assessment.

References

1. Colodny N. Interjudge and intrajudge reliabilities in Fiberoptic Endoscopic Evaluation of Swallowing (fees) using the penetration-aspiration scale: a replication study. Dysphagia 2002;17(4):308-15.
2. Miles A, Hunting A, McFarlane M, Caddy D, Scott S. Predictive Value of the New Zealand Secretion Scale (NZSS) for Pneumonia. Dysphagia. 2018 Feb;33(1):115-122.
3. Neubauer PD, Rademaker AW, Leder SB. The Yale Pharyngeal Residue Severity Rating Scale: An Anatomically Defined and Image-Based Tool. Dysphagia. 2015 Oct;30(5):521-8.
4. Rosenbek JC,Robbins JA, Roecker EB, Coyle JL, Wood, JL. A Penetration-Aspiration Scale. Dysphagia. 1996 Spring;11(2):93-8.
S   teele CM, Grace-Martin K. Reflections on Clinical and Statistical Use of the Penetration-Aspiration Scale. Dysphagia. 2017 Oct;32(5):601-616.

P097 Fig. 1

6. Wallace S, McLaughlin C, Clayton J, Coffey M, Ellis J, Haag R, Howard A, Marks H, Zorko R. Fibreoptic Endoscopic Evaluation of Swallowing (FEES): The role of speech and language therapy. London: Royal College of Speech and Language Therapists, Position paper. 2020.

P099

Effects of home-based cueing training on motor performance on people with Parkinson's disease implemented by a sensory interactive system

E. Villamil-Cabello (Madrid/ES), A. Jiménez-Gutiérrez (Madrid/ES), M. Fernández-del-Olmo (Madrid/ES)

Background: Several studies indicate the positive effect of cue training on motor function in patients with Parkinson's disease. A relevant question is whether implementing this type of training through technology in the patient's own home would also be effective.

Objective: To investigate the effect of cueing training on motor perfomance (gait and upper limb movement) in patients with PD, implemented by an electronic and digital device in their own home environment. (ClinicalTrials.gov Identifier: NCT05829915)

Method: 40 subjects with Parkinson's disease were randomly assigned to an experimental group and control group.

The EG participated in 25 sessions (5 /week) of a homebase cueing training program. Before (Pre) and after (Post) the program, performance on gait and upper limb movements were evaluated. The CG only perform the evaluations.

The intervention program was design and implemented with the ROXPro© system (A-Champs). This system consists of devices that provide visual, auditory and vibration stimuli with which the user interacts. Through its mobile application, it allows the development of numerous sensory-cognitive-motor exercises adapted to the characteristics of the person. In this study, the own patient implemented the sessions previously design by the therapists. Each session last approximatively 30 minutes and the exercises were increased in difficulty across sessions following the feedback provided by the patients.

Results: The statistical analysis (ANOVA Group*Test) showed a significant improvement for gait at maximal speed, choice stepping reaction time, choice tapping reaction time and reaching speed in the Experimental Group without improvement sin the control group.

This study shows that the implementation at home cueing training program is feasible and positively affects motor performance Parkinson's.

P100

Evidence-based recommendations for physical therapy in idiopathic Parkinson's disease. A systematic review of evidence-based guidelines

A. Bremer (Senftenberg/DE), B. Scheffler (Senftenberg/DE), L. Iden (Senftenberg/DE), C. Kopkow (Senftenberg/DE)

Background: In Germany, currently approximately 400,000 people are affected by idiopathic Parkinson's syndrome (IPS). Parkinson's disease is therefore the second most common neurodegenerative disease after Alzheimer's disease [1]. People with IPS can achieve a good quality of life through physiotherapeutic treatment [2]. Clear and detailed guideline recommendations can support evidence-based practice and reduce barriers in their implementation [3]. This would not only lead to a higher quality of care for those affected, but also optimize the existing resources, which is essential in view of the increasing prevalence of this disease.
Objectives: The aim of this review is to systematically assemble current physiotherapeutic guideline recommendations, critically assess their methodological quality and consistency.
Methods: The methodology and reporting follow the PRISMA checklist for systematic reviews [4]. The literature search was conducted in December 2022 in bibliographic databases and international guideline repositories. The inclusion criteria were: 1) guidelines that 2) were no more than 5 years old and 3) included recommendations on physiotherapeutic interventions for 4) people with IPS. Two independent reviewers selected titles and abstracts as well as full texts based on the stated criteria. All included guidelines will be evaluated using the AGREE II tool, and bibliographic and relevant content data will be extracted using the CERT checklist. In addition, the strength and direction of the recommendation, as well as the quality of the underlying evidence, will be extracted and analyzed for consistency.
Results: Through systematic literature search, 926 **Results** were obtained, 25 full texts were screened, and 5 guidelines were included. At the time of submission, the review is still in progress.
Conclusion: Based on the review, insights into the quality of international guidelines, as well as the level of detail and consistency of physiotherapeutic guideline recommendations for the treatment of individuals with IPS, are expected. This will result in recommendations for a targeted theory-practice transfer.

References:
1. Feigin VL, Nichols E, Alam T et al. Global, regional, and national burden of neurological disorders, 1990 – 2016: a systematic analysis for the Global Burden of Disease Study 2016. The Lancet Neurology 2019; 18: 459-480. doi:10.1016/s1474-4422(18)30499-x
2. Sveinbjornsdottir S. The clinical symptoms of Parkinson's disease. Journal of neurochemistry 2016; 139: 318-324
3. Slade SC, Bruce C, McGinley JL et al. Patient and care partner views on exercise and structured physical activity for people with Progressive Supranuclear Palsy. PLOS ONE 2020; 15: e0234265. doi:10.1371/journal.pone.0234265
4. Moher D, Liberati A, Tetzlaff J et al. Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Medicine 2009; 6: e1000097. doi:10.1371/journal.pmed.1000097

P101

Sialorrhoea Clinic: a quality improvement project to expand patient services and reduce subsequent costs to the NHS

O. Khan (Southampton/GB), E. Mason (Southampton/GB), J. Mamo (Southampton/GB)

Introduction: Sialorrhoea is defined as excessive saliva accumulation leading to unintentional loss of saliva from the mouth and is commonly associated with long-term neurological conditions including Parkinson's disease (PD), motor neurone disease (MND), cerebral palsy (CP), stroke and multiple sclerosis (MS).
Sufferers may experience complications such as poor oral hygiene, bad breath, perioral dermatitis, dehydration, eating and speaking difficulties and sleep disturbance. Sialorrhea may also cause aspiration pneumonia which results in significant burden of acute hospital bed days for patients
There is currently no defined pathway for the management of sialorrhoea within Southampton University Hospitals. In 2019 NICE published guidance on Xeomin (botulinum neurotoxin type A) for the treatment of chronic sialorrhea in adults with neurological conditions which suggested the injection of Xeomin should be of first line use. Treatment with Xeomin demonstrates cost effectiveness relative to other medical and non-medical intervention or standard care, which includes speech and language therapy, swallowing aids and bibs
Aim: The aim of the Sialorrhoea clinic is to establish a pathway for patients to access outpatient services for Xeomin Botulinum Toxin A treatment. The clinic would predominantly be aimed at patients with chronic and/or progressive neurological disorders. We have written a business case to University Hospitals Southampton to evidence the need for provision of this clinic and will gather outcome measures and relevant data following implementation. We expect to see improved patient outcomes whilst also showing overall cost reduction to the hospital and may facilitate other NHS Trusts to roll out a similar service with the knowledge of better patient outcomes whilst also making the NHS more cost effective
Method: We will open up referrals to the Southampton University Hospital catchment area which serves a population of approximately 3 million people. NICE estimates there are approximately 34 000 people in the UK with chronic sialorrhea which means our clinic may expect to see 1500 patients. Not all of these patients will require treatment with Xeomin but we expect the clinic to have high demand.
We will gather data regarding drooling severity scales as well as data regarding the number of hospital admissions due to sialorrhoea related problems. We anticipate a reduction in overall costs to the Trust by providing this service which is also the current position held by NICE
Results: Data from other previous research has all ready demonstrated cost effectiveness of Xeomin treatment. Our data will help to quantify this whilst also collecting other useful data relating such as reduction in hopsital admissions and drooling severity scales.

P102

Ultrasound-guided dry needling for wrist tenosynovitis and carpal tunnel syndrome: efficacy and outcomes

R. Bubnov (Kyiv/UA), L. Kalika (New York, NY/US), G. Pilecki (Zabrze/PL), Z. Pilecki (Zabrze/PL)

Introduction: Synovial inflammation in rheumatic diseases often results in tendon sheath fluid, which requires appropriate treatment. In addition, muscle trigger points (TrPs) can cause myofascial pain, leading to muscle, fascia, and tendon overload. Dry needling under ultrasound guidance (DN-US) is an effective therapeutic option for treating myofascial pain. DN-US has been proven to restore muscle function and motion, reduce fascia overload, and decrease fluid amounts in the tendon sheath [1, 2, 3].

This study aims to evaluate the efficacy of ultrasound-guided dry needling in treating wrist tendinopathy and carpal tunnel syndrome (CTS) after injury.

Methods: We recruited 16 patients (7 females, aged 22–67 years) with symptoms of CTS and pain in the wrist and hand, as well as signs of tenosynovitis in forearm muscles after injury or forearm bone fractures (1 month prior). Patients with paresis, advanced injuries, or cancer were excluded. All patients underwent general exams, precise physical tests, functional neuromuscular ultrasound using 4–8 MHz/5–12 MHz M-mode, sonoelastography (SWE), and measurements of overall postural stability. We also conducted an ultrasound median nerve neurodynamic test.
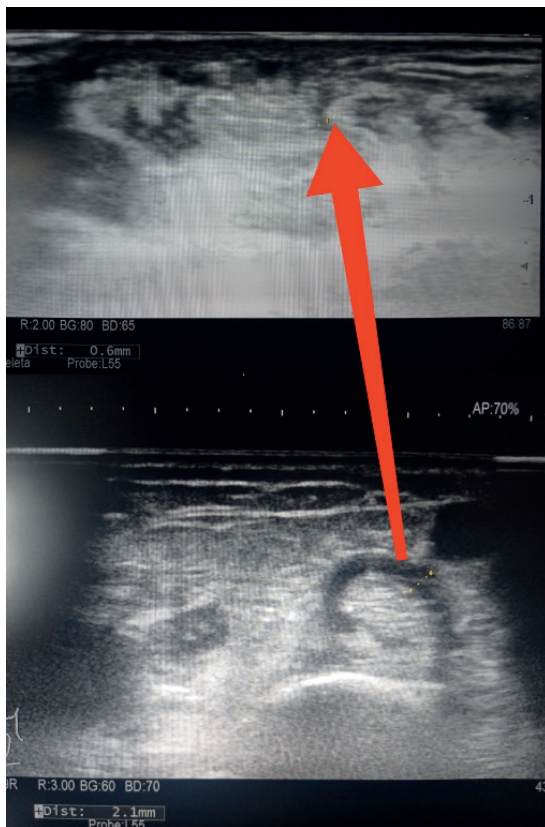
P0102 Fig. 1

Results: All patients demonstrated a 90**%** reduction in pain as measured by a VAS score and experienced pain relief after one month of observation. Sonoelastography (SWE) of the tendon showed decreased stiffness from 18-40 kPa to 8-14

kPa. The fluid around the tendons of flexors and extensors decreased from 3-4 mm to 0.3-0.7 mm after 1-2 DN-US sessions, and the ultrasound architecture of the tendons was restored. After DN-US, neurodynamic test scores and symptoms of neuropathic pain and arm numbness improved. We observed a decrease in the cross-sectional area (CSA) of the carpal tunnel, swelling tissues, and restored movement of tendons, which likely enabled an improvement in the movement of the median nerve.

Conclusions: Ultrasound-guided dry needling of trigger points is an effective treatment option for CTS and myofascial hand and wrist pain. It improves tendon structure, decreases stiffness and fluid amounts around tendons in the tendon sheath.

References:
1. Bubnov RV. Evidence-based pain management: is the concept of integrative medicine applicable? EPMA J 2012, 3(1):13.
2. Bubnov R, Kalika L, Babenko L. Dynamic ultrasound for multilevel evaluation of motion and posture in lower extremity and spine. Annals of the Rheumatic Diseases 2018;77:1699. http://dx.doi.org/10.1136/annrheumdis-2018-eular.3949
3. Bubnov R, Kalika L. FASCIAL ULTRASOUND: THE CONTEXT FOR DRY NEEDLING TRIGGER POINTS IN TREATMENT OF MYOFASCIAL PAIN, POSTURAL IMBALANCE. Annals of the Rheumatic Diseases 2021;80:924-925. http://dx.doi.org/10.1136/annrheumdis-2021-eular.3843

P103

Potential concussion events: incidence and return-to-play procedures in a soccer team from the Spanish professional soccer league (2019–2020)

E. Noé (Valencia/ES), R. Llorens (Valencia/ES), B. Moliner (Valencia/ES), M. D. Navarro (Valencia/ES), M. Barrio (Valencia/ES), P. Ugart (Valencia/ES), B. Melero (Sevilla/ES), C. Colomer (Valencia/ES), M. O´ Valle (Valencia/ES), J. Ferri (Valencia/ES)

Introduction: Repetitive subconcussive injuries have the potential for long-term deleterious effects on brain function and neurodegeneration in select individuals.

Objectives: To describe, through standardised observation of video footage by two trained observers, the frequency and the characteristics of all potential concussion events (PCE) of a professional soccer team of the Spanish Professional Soccer League followed throughout a full season (2019-2020) and to analyze the "return-to-play" procedures developed after suffering a PCE.

Methods: Two independent researchers reviewed and analyzed the main characteristics of all the PCEs detected during the 38 matches of the Real Madrid C. F along the 2019-2020 Spanish soccer season (https://youtu.be/1gpltV2s5Bs). Immediate (medical assistance, substitution, etc.) and deferred (reincorporation to sport activity) management after each EPC was also registered (https://youtu.be/G0tbz0s82HI).

Results: Fifteen players from Real Madrid C. F. sustained at least one PCE along the duration of the study. A total of 61 PCEs (48.6/1000h) were identified. The majority of EPC occurred after "head duels" by "elbow-to- head" mechanism affecting parieto-occipital and fronto-nasal areas. The most vulnerable players were defenders playing in the goal areas. Most PCEs occurred during the minutes 31-60, and with a tie score. 45.9**%** of the PCEs were not penalized. Medical assistance was requested in only 21.3**%**, and substitution was only made in 25.3**%** of cases. Interestingly, 71.6**%** of players returned to sport activity in less than seven days from the subconcussive event.

Conclusion: Our results are in agreement with other recent studies and point out the importance of detecting this type of events due to their high prevalence and their possible negative effects on the neurological health of soccer players. It is necessary to raise awareness among the general public, professionals and leaders about this type of subconcussive events.

P104

Psychological effects of robot-assisted gait training according to degree of paralysis in spinal cord injury

B. S. Lee (Incheon/KR), N. Jeon (Incheon/KR), D. Y. Cho (Seoul/KR)

Objective: To evaluate the psychological effects of Robot-Assisted Gait Training(RAGT)
Methods: We analyzed the perceptions regarding RAGT in persons with Spinal Cord Injury(SCI) (n=61) and clinicians (n=197). And we did Randomized Control Study(RCT) To analyze the psychological effects of Robot-assisted Gait Training (RAGT) in person with SCI. Subjects were 15 patients for the experimental group (RAGT), and 15 patients for the control group (conventional therapy). The Interventions were 12 sessions with Lokomat (Hocoma, Swiss), 3 times a week for 4 weeks. The evaluation tools were the ISO standards usability test (Satisfaction, Efficiency, Effectiveness), and the Emotional Rating Questionnaire (20 items, 5-point scale).
Results: The survey showed that 61.3% of the clinicians and 72.8% of the persons with SCI agreed with the sentence "Despite no possibility of physical recovery, RAGT should be performed for psychological benefits". In the RCT study, the satisfaction and effectiveness of the ISO standards usability test were higher in the experimental group (p<0.05). After the 12 sessions, positive emotions were observed in the motor incomplete group(ASIA impairment scale C and D), but the motor complete group(ASIA impairment scale A and B) showed negative emotions.
Conclusions: Treatment providers and recipients all have high expectations regarding RAGT and a high percentage replied that despite no possibility of physical recovery, RAGT should be performed for psychological benefits. After the 12 sessions, positive emotion was observed in the motor incomplete group, but the motor complete group showed negative emotion.

P105

The effects of hand function and trunk balance on the self-care of patients with incomplete spinal cord injury

J. E. Lim (Seoul/KR), D. Y. Cho (Seoul/KR), J. M. Lee (Seoul/KR), O. Kim (Seoul/KR)

Introduction: Personal independence is severely compromised in persons with tetraplegia. Self-care is a course of action implemented by an individual to meet everyday needs. In the Spinal Cord Independence Measure III (SCIM-3), the self-care category reflects upper extremity performance, and some items may be related to the stability of the trunk. To date, these have not been investigated.
Objective: This study aimed to contribute to knowledge on the self-care of patients with spinal cord injury (SCI) by analyzing the effects of hand function and trunk balance on self-care capacity in these patients.
Methods: In this study, 56 patients with tetraplegia according to the American Spinal Injury Association (ASIA) Impairment Scale [AIS] B, C, and D were included. Patients were assessed using 1) the Korean SCIM-3 (KSCIM-3) self-care scale, 2) the graded and redefined assessment of strength, sensibility, and prehension (GRASSP), 3) the trunk impairment scale (TIS). Multiple regression analysis was performed to investigate the effects of GRASSP and TIS on the KSCIM-3 self-care category in patients with SCI.
Results: The effect of the GRASSP scores on the KSCIM-3 self-care scores in patients with SCI was investigated. The F value was 20.792, and the significance probability was 0.000. The GRASSP scores included in the model significantly explained the KSCIM-3 self-care at the 0.05 significance level. The coefficient of determination (R^2) that was used for verifying the goodness of fit in the model was 0.620, resulting in 62% explanatory power. The contribution of each independent variable to the dependent variables, and the statistical significance, were tested. The **Results** showed that quantitatively, (t=3.152, p=0.003) prehension significantly affected the KSCI-3 self-care score at the 0.05 significance level. The other items were not statistically significant. The effect of the TIS scores on the KSCIM-3 self-care scores in patients with SCI was investigated. The F value was 25.582, and the significance probability was 0.000. The TIS scores included in the model significantly explained the KSCIM-3 self-care at the 0.05 significance level. The coefficient of determination (R^2) that was used for verifying the goodness of fit in the model was 0.596, resulting in 59.6% explanatory power. The contribution of each independent variable to the dependent variables, and statistical significance, were tested. Static sitting balance (t=2.477, p=0.017) and co-ordination (t=2.287, p=0.026) affected the KSCIM-3 self-care score at the 0.05 significance level. The other items were not statistically significant.
Conclusion: The self-care capacity of patients with SCI was shown to be affected by prehension as assessed quantitatively in the GRASSP and static sitting balance and coordination as assessed by the TIS. Hence, quantitative tasks, such as grasping or moving a coin, the ability to fix and maintain trunk positions, and trunk rotation ability, have significant effects on self-care capacity.
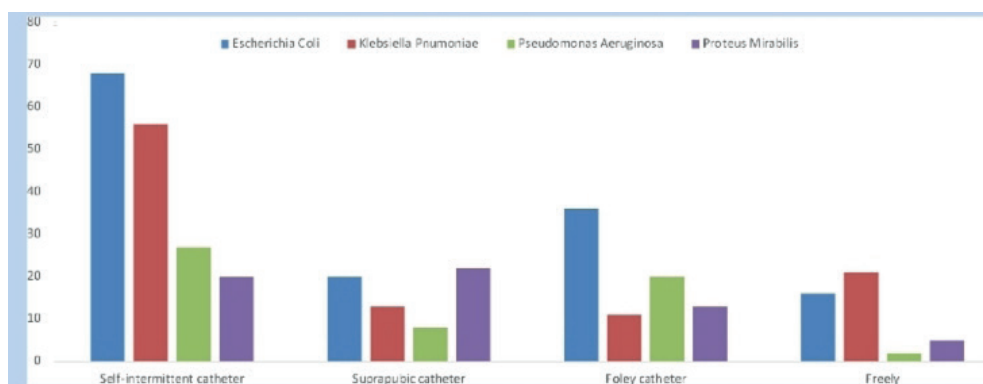
P106

### Urinary tract infection antibiogram in patients with spinal cord injury in Riyadh

S. Alshahri (Riyadh/SA)

Background: Antibiograms are sensitivity/resistance profile of a microbial species to a group of antibiotics. Every year, around the world, between 250 000 and 500 000 people suffer a spinal cord injury (SCI). The Kingdom of Saudi Arabia has has one of the highest rates of spinal cord injuries worldwide Urinary Tract Infection (UTI) in Spinal Cord Injury (SCI) patients, Kingdom of Saudi Arabia has has one of the highest rates of spinal cord injuries worldwide. Neurologic lower urinary tract dysfunction is a common complication after SCI. People with SCIs are at a significant risk of morbidity from urinary tract infection (UTI) with approximately 2 episodes of UTIs per year. The problem of frequent UTI is amplified by the high prevalence of multiple resistant organ-

P106 Fig. 1

P106 Fig. 2
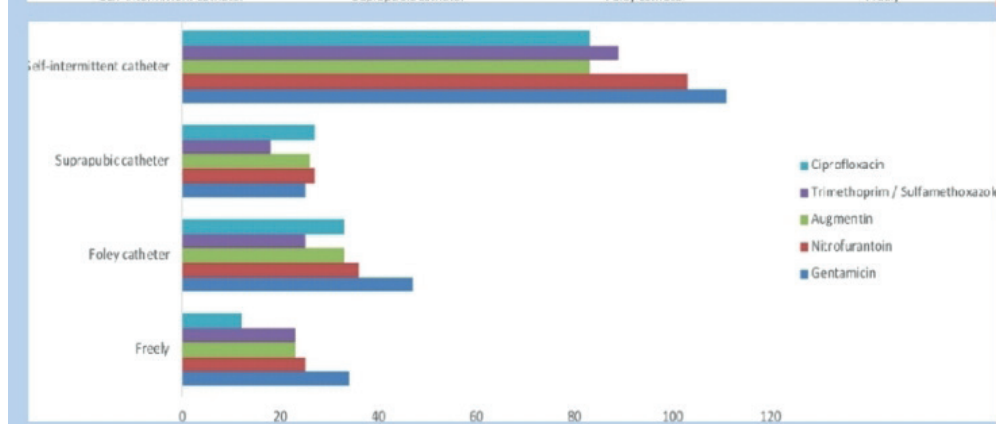
ism (MRO) within SCI populations.Most cases of septicemia in these patients can be attributed to the urinary tract, with a death rate of about 15%.

Urinary Tract Infection (UTI) in Spinal Cord Injury (SCI) is a common complication from neurogenic bladder and it is a frequent cause of a recurrent visit to hospitals. A major challenge to the treating physician is that simple antibiotics are not effective and there is no clear recommendation for what type of the emperical antibiotics should be started for such patients. Our goal to stablish first ational antibiogram data for patients with UTI after SCI.

Methodology: Retrospective study of 402 urine cultures were collected from 92 patients who had previously admitted to our rehabilitation department between 2009 and 2019. Only urine cultures with significant bacteruria >100000 were collected. Our demographic data included gender, age, level of injury, type of bladder management .

Results: Demographic data were as follows:

Male n=81(88%), female n=11(12%), mean age is 39, paraplegia n=47(51%), tetraplegia n=45(49%), Suprapubic catheterisation (SPC) was the most voiding method n=42 (45.7%), followed by self intermittent catheterisation (SIC) n=40 (43.5%), most common organism with SPC was proteus mirabilis 29.6%, escherichia coli was the most common in SIC by 27% and Foley's cath by 31%. Klebsiella pneumonia was the most common organism in voiding freely cultures. Overall sensitive antibiotics for all cultures were as follow; Gentamicin (46.8%), Nitrofurantoin (39.1%), Augmentin (35.1%) and Ciprofloxacin (32.6%).

Conclusion: Variation in voiding methods in SCI patients resulted in different causative organism of UTI.

Next step is to do larger multi-center study to establish a national antibiogram of UTI for SCI patients.

P107

AMAR: Mobile health strategy to promote collaborative practice between families and healthcare professionals in monitoring the growth and development of Brazilian children

G. Gomes da Fonseca Filho (Natal/BR, Santa Cruz/BR), I. T. Gonçalves Fernandes (Natal/BR), W. A. Costa dos Santos (Natal/BR), J. L. Medeiros da Silva (Natal/BR), L. K. Praxedes Mariz (Natal/BR), C. Aires Mayer (Natal/BR), A. G. Camara Dantas Ribeiro Rodrigues (Natal/BR), A. R. Lindquist (Natal/BR, Natal/BR)

Introduction: In Brazil, primary healthcare plays a vital role in monitoring child growth and development. However, there is evidence indicating the challenges in adequately tracking developmental milestones and early diagnosis of neurological disorders in low- and middle-income countries. One strategy identified in the literature to address this issue is the promotion of positive parenting practices, which involve empowering families and fostering collaborative efforts between them and healthcare professionals. In this context, the development of a tool aims to facilitate a strong connection between families and healthcare professionals, ultimately enhancing the screening of child development. **Objective:** To develop and validate an mHealth tool that enables parents and healthcare professionals to collaboratively monitor child growth and development. Materials & **Methods:** This mixed-method study follows a qualitative and quantitative approach for system development, adhering to the recommendations of participatory interaction design methodology. The process involves four stages: (1) identification of user needs; (2) solution design; (3) construction of a functional prototype; and (4) evaluation. The study received ethical approval from the Ethics and Research

Committee (opinion number 48108021000000129). For the evaluation stage, healthcare professionals with expertise in child development and families with at least one child under the age of 2 participated in a content validity test. Participants were introduced to the software and responded to a questionnaire assessing content and design. Data analysis involved calculating means, standard deviation, frequency, and the content validity index.

Results: The AMAR system (Application for Monitoring, Assessment, and Tracking of Child Development) was developed as a web and mobile application. It utilized a responsive front-end design and a JavaScript-based back-end for communication between the two applications. PostgreSQL version 12.5 was employed for data storage and management, and an Application Programming Interface using Django Rest Framework version 3.12.4 was created to facilitate communication between system components. The content validity evaluation, involving 10 healthcare professionals and 10 families, resulted in a Content Validity Index of over 80**%** for all questions. This indicates that the content of the AMAR system was relevant and appropriate for facilitating collaborative monitoring of child growth and development.

Conclusion: The AMAR system effectively provided relevant content for facilitating collaborative monitoring of child growth and development between families and healthcare professionals. By empowering families and promoting a strong bond between them and healthcare professionals, the tool contribute to the enhanced screening of child development.
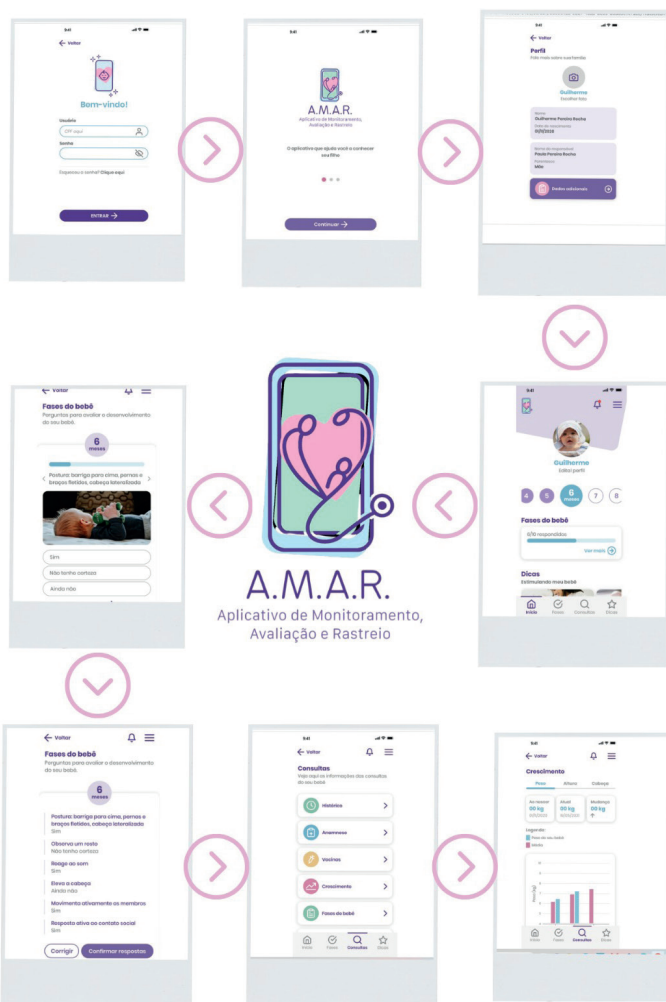
P107 Fig. 1

P108

Eagle syndrome with internal carotid dissection in a C5 tetraplegic man: a case-report

M. Duboisset (Lyon/FR), H. Ardaillon (Lyon/FR), N. Stacoffe (Lyon/FR), G. Rode (Lyon/FR)

Background: Eagle syndrome (ES) is a rare condition resulting in a prolongated styloid process (PSP), either constitutional or acquired (i.e., calcified stylohyoid ligament). Normal styloid process is measured from 2.5 to 3.0 cm and only 4**%** of general population present a PSP. PSP can provoke local compressions concerning arterial (internal carotid artery, ICA) or nerve structures (Cranial nerves V, VII, IX, X).

Objectives: We report herein a rare case of Eagle syndrome in a tetraplegic patient who presented with ICA dissection.

Method and Results: We report the case of a 55-year-old right-handed man, presented with a bicycle fall with spinal cord injury followed by a C5 AIS A tetraplegia. He had no surgical history and was initially treated by anterior cervical decompression and C6-C7 fusion with a right-sided surgical approach. Facing persistent neuropathic pain, a medullar MRI was performed at month 7, showing C6-C7 and T2 syringomyelic cavities which progressed from C4 to T4 at month 13. At month 18, he presented with autonomous hyperreflexia and urinary sepsis was suspected. Two days later, he presented with left cervical pain and MRI showed ruled-out progression of syringomyelia. CT-scan revealed incidentally a left prolonged styloid process (Figure 1, left PSP >5 cm, right at 3cm) with left internal carotid artery (ICA) dissection (3 cm). Rivaroxaban was introduced and patient was positioned supine with head tilt up to 30° for maintaining cerebral perfusion. He reported left temporal pain and pulsatile left eye pain which were increased while head turned left. At month 22, arachnoidolysis and syringo-subarachnoidian shunting was performed and allowed complete relief of autonomic hyperreflexia and positioning in sitting position was possible again, but neuropathic pain persisted. At month 23, otorhinolaryngologist advised not to perform styloid process ablation.

ES is an uncommon condition (4**%** of general population) and only a minority of patients with PSP are symptomatic. Tonsillectomy or cervical surgery is often evocated as a potential cause of ES, but our patient had no surgical history prior to the initial cervical fusion. In our case, left prolonged styloid process was suspected to have provoked arterial dissection. At the initial phase, ICA dissection was retrospectively symptomatic only for the cervical pain. The presentation was then consistent with ICA impingement: he reported left temporal pain and pulsatile left eye pain which were increased while head turned left. We hypothesize that PSP was constitutional in our patient and tetraplegia provoked overuse of cervical musculature and thus increased
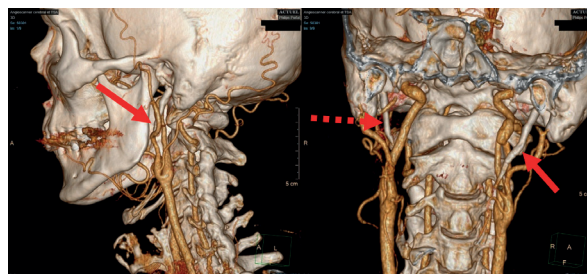
P108 Fig. 1

mechanical conflicts between PSP and ICA, eventually leading to ICA dissection.

P109

Impact of strain counter strain on treatment of acute nonspecific low back pain: a single blind randomized controlled trial

B. El-Nassag (Cairo/EG), G. Koura (Damam/SA, Cairo/EG), H. Ahmad Hamada (Cairo/EG), Y. Mohamed (Cairo/EG), A. Balbaa (Cairo/EG), A. Baghdadi (Cairo/EG, Wakrah/QA)

Background: This study was to assess the post-treatment and six weeks follow-up effectiveness of Strain Counter Strain techniques (SCS) on pain, range of motion (ROM), and disability in patients with acute Nonspecific Low Back Pain with mobility deficits.
Methods: Eighty-four patients diagnosed with Nonspecific Low Back Pain with mobility deficits were divided into two groups. Forty-two patients received SCS techniques (group A) and forty-two patients control group received advices to be active (group B). The Pressure Pain Threshold (PPT), Lumbar flexion ROM and Oswestry Disability Index (ODI) were used for assessment. All patients were assessed before, after treatment, and six weeks follow-up. The treatment program was conducted for two weeks, two sessions per week.
Results: Statistical analysis revealed that there were significant increases in PPT on both sides of L5 and lumbar flexion ROM. In addition, there was a significant reduction in ODI scores ($p < 0.05$) in the (Pre vs. post-treatment), (Pre vs. post-six weeks), and (Post-treatment vs. post-six weeks) regarding to both groups. Regarding between groups effects multiple pairwise comparisons revealed that there were significant increases in PPT on both sides of L5, and lumbar flexion ROM in addition to a significant reduction in ODI scores ($p < 0.05$) in favor to group A in comparison to group B in post-treatment and post six weeks of treatment.
Conclusion: SCS is preferable to be advised in the treatment of Acute Nonspecific Low Back Pain with mobility deficits.
Keywords: Strain Counter Strain, Acute Nonspecific Low Back Pain, Oswestry Disability Index.

P110

The neurorehabilitation challenges of post-traumatic C5-C6 Monoparesis of the left upper limb

A. S. Nica (Bucharest/RO), D. A. Rindasu (Bucharest/RO), S. Askin (Bucharest/RO)

Introduction: spinal cord lesion C5–C6 level can be associated with monoparesis represents under 5**%** of the total number of injuries and the frequency increases after the age of 40.
We present a patient aged 82, right-handed, smoker, hypertension, chronic alcoholic, with traumatic spinal C5-C6 injury by falling (17.02.2022), anterior C5-C6 subluxation, C6 fracture. A surgical intervention has been required - anterior synthesis with autologous bone fragment and fixed with metal rod and screws. He was admitted in rehabilitation hospital Bucharest after 6 months with severe joint stiffness of the left shoulder (extension, abduction and adduction deficit) and elbow (flexion deficit), significant muscular hypotrophy in the shoulder girdle, arm and forearm, with conservation of activity of the triceps and marked decrease of the muscular force in the arm and hand (FM= -3 MRC), as well as in the forearm (FM=2 MRC), high-intensity pain (VAS=8/10) in the shoulder, with mixed character predominantly inflammatory, hyposensitivity of the left upper limb.
Objective: Recovery plan was focused on the aim of diminishing joint pain, restoring range of motion especially for the functional angles of the shoulder, elbow, fist and fingers, increase the muscular strength of agonist-antagonist groups of the arm, forearm and hand, tonifying the shoulder girdle and improvement of the left hand for all the abilities and IADL.
Material & Method: The patient underwent pharmacological antilgic treatment (ibuprofen and paracetamol) and physical-kinetic procedures with the following antalgic and trophic electrotherapy appliances: Interference current, Diadynamic currents, Magneto diaflux, Therapeutical massage, Ultrasound, KT with elements of occupational therapy.
Results & Discussions: the evolution has been slowly favorable, subjectively and objectively, by reducing the pain VAS=3/10, increasing the functional range of motion and improvement of the muscular force from -3 to 3 MRC, 2 to 3 MRC respectively.
Conclusions: Aged patient with comorbidities, needs the increase of the level of independence, and to have periodical effect feed-back of the home rehabilitation.
Keywords: spinal cord lesion, brachial monoparesis, disability

P111

Spinal myoclonus post spinal instrumentation

N. T. Shan (Wolverhampton/GB), S. Young Hsueh Yi (Wolverhampton/GB)

Background: Spinal myoclonus is characterized by myoclonic muscular contractions usually associated with spinal cord injury, post spinal instrumentation, spondylosis, tumours, infections, or ischemia. This may present a diagnostic challenge leading to unnecessary investigations.
Objective: Our case presentation is to highlight that spinal myoclonus as one of the possible complications of spinal instrumentation which can hinder a patient's rehabilitation journey.
Method: A 50 year-old female, with past medical history of three previous spinal instrumentation was admitted with C4–C6 spinal cord stenosis and underwent postersior decompression and instrumented fusion. She was started on a post-operative in-patient rehabilitation program. During this period, she developed intermittent myoclonic movements in her arms and legs with variable frequency and amplitude, which hindered her rehabilitation. These movements were sudden, unpredictable and distractable. She experienced about 1–2 episodes each day, with each episode lasting for a few minutes. No significant trigger factors noted. The neurological examination was stable. A working diagnosis of spinal myoclonus was made based on clinical presentation and recent spinal instrumentation. She was then started on clonazepam and titrated according to severity of symptoms.
Result: She was successfully treated and continued to make functional improvement. Her myoclonus frequencies have reduced to about 3–4 episodes per week, each time lasting for a few seconds.

Conclusion: Recognizing spinal myoclonus as one of the complications in patients with spinal instrumentation can prevent unnecessary investigations and providing appropriate treatment can improve the patient's symptom and rehabilitation outcome.

P112
Enhanced spinal trauma rehabilitation (ESTRE) programme design and outcomes

O. Khan (Southampton/GB), E. Mason (Southampton/GB), J. Mamo (Southampton/GB)

Introduction: Our Major Trauma Centre (MTC) admits patients for management of acute spinal cord injuries. These patients require specialist inpatient neurorehabilitation to maximize their functional outcomes. This level of rehabilitation is not provided by the Major Trauma Centre and the average wait for a specialist rehabilitation bed at the Regional Spinal Cord Injury (SCI) Rehabilitation Centre is around 16 weeks. Evidence indicates that early access to specialist rehabilitation following SCI improves patient outcomes and is cost effective.
Objectives: The ESTRE Project provides early rehabilitation within the MTC prior to transferring to the spinal injury centre. Aims to improve efficiency and reduce costs at point of care.
Method: Project funding was acquired through NHS England Transformation Programme to provide enhanced rehabilitation within the MTC for six spinal cord injury rehabilitation beds. The project includes additional physiotherapy, occupational therapy, rehabilitation assistant input, nursing assistant input and additional clinical input from a Consultant in Rehabilitation Medicine.
Results: Twenty-Seven patients accessed the project within the initial 4 months. Average length of stay was reduced by 64 days (105 days down to 41 days) when compared to data for previous 12 months. This indicated a cost saving of over £2m per annum (excluding medical staffing costs). There was also 9**%** increase in the number of patients able to return directly home.
Conclusion: Early rehabilitation input in spinal injury care can have positive impacts on in-patient length of stay and has a direct impact on cost efficiency as a result of a more efficient service

P113
Prospective analysis of pre-treatment quality of life, presenteeism and emotional health due to chronic neck pain in homemakers – an Indian tertiary care hospital perspective

M. Sengupta (Kolkata/IN), J. Nandi (Raipur/IN)

Background: Chronic neck pain globally causes neuromuscular dysfunction, substandard quality of life and suboptimal emotional health. It often affects the work productivity of an individual. Work productivity is measured by either "absenteeism" or "presenteeism". Homemakers are a neglected part of the society who perform a multitude of ergonomically stressful activities leading to multitude of musculoskeletal pain.

Objective: The objective of this study is to analyse the impact of chronic neck pain in the pre-treatment quality of life, presenteesism and emotional health in homemakers and to find its association with the cause and severity of chronic neck pain.
Materials and Methods: This prospective, cross-sectional study was conducted at the Department of PMR of AIIMS, Raipur India, over 3 months including 64 female homemakers between 18-55 years of age with chronic neck pain who visited the PMR OPD. Data was collected offline in a Microsoft Excel version 2007 spreadsheet and R software 3.5.2 was used for analysis.
Results: The diagnosis was divided into four major causes of chronic pain. The mean value of the VAS score being 5. Hospital anxiety depression scale (HADS) was found to be significantly higher in <40 years age and less educated subgroups. The highest value of Work functioning impairment scale was seen in the "chronic musculoskeletal pain" group. The Medical Outcomes Study Short-Form Health Survey (SF 36) was found to be highest in the "Others" category.
Discussion and Conclusion: Homemaking is a standalone occupational category. The myriad of health hazards faced by this cohort in a traditional low income country like India requires a sensitive and multidisciplinary approach. Chronic neck pain has both physical and emotional impact in this population and variably affects their productivity. Although this study was done in the pre covid era. the relevance of this study has become more important in the post covid world where presenteeism is being studied in new light in different cohorts.
Keywords: homemakers, presenteeism, chronic neck pain

P114
The effect of body weight assisted treadmill training on bone mineral density in chronic spinal cord

S. Kamble (Pune/IN)

Objective: The purpose of this research was to determine the body-weight supported treadmill training (BWSTT) impacted bone in people who had had a spinal cord injury (SCI).
Material & Methodology: We identified eight persons who have been suffering with chronic traumatic spinal cord injury for more than two years. Bone Mineral Density (BMD) of the proximal femur, distal femur, proximal tibia, and lumbar spine were assessed before and after 6 months (twice-weekly) body-weight supported treadmill training (BWSTT).
Result: As a result, all participants had BMD reductions ranged from 1.2 to 26.7**%** in all subjects at practically all lower limb sites following training. BMD changes in the lumbar spine varied from 0.2 to 7.4**%**.
Conclusion: There was found following chronic SCI, regular BWSTT can help to prevent bone loss.

P115

Unique case of nutritional peripheral neuropathy with psychiatric manifestations in a young lady following sleeve gastrectomy underscoring the role of nutrition as an interface between physical rehabilitation and public health

M. A. Rana (Wolverhampton/GB), M. Mariappan (Wolverhampton/GB)

Introduction: Sleeve gastrectomy is a common surgical procedure used for weight loss that has many benefits, but it can also cause a range of complications, including nutritional deficiencies. Nutritional Peripheral NeuroPathy (NPNP) is a rare but debilitating complication of weight loss surgery that can lead to limb weakness, sensory disturbances, and other neurological symptoms. This case report describes a unique case of imbalance on the Public Health Nutrition (PHN) Spectrum Disorder.

Objectives: The objective is to present a case of NPNP in a young lady who underwent sleeve gastrectomy for weight loss, with a focus on the clinical presentation, diagnosis, and management of this rare but serious complication. This case also highlights the importance of a unique MDT approach in managing NPNP in patients with psychiatric comorbidities, which are not typically seen in a neurorehab setting. Furthermore, this case emphasizes the importance of nutrition in the interface between physical rehab and public health.

Patients & methods: A 25-year-old lady with a history of body dysmorphic disorder underwent sleeve gastrectomy in Turkey in October 2022, resulting in a massive weight loss of 7 stones (44kg) over the next few months. She was admitted to the hospital twice, first in December 2022 with low mood, vomiting, and abdominal pain, and later in January 2023 with gradually progressive limb weakness and ascending sensory disturbances. Her medical history, physical examination, laboratory investigations, imaging studies, and treatment outcomes were documented and analyzed.

Results: The patient's blood work showed raised inflammatory markers and deficiencies of vitamin A, D, and E, while her MRI of the brain and spinal cord was normal. She was diagnosed with NPNP, which was likely due to the protein-based diet she was following after the sleeve gastrectomy. She also had psychiatric manifestations of low mood and body dysmorphic disorder, which complicated her management.

The team's approach involved addressing the patient's nutritional deficiencies through vitamin supplementation, as well as treating her psychiatric symptoms through CBT and antidepressant medication. The OT and PT were also involved in her care, helping to improve her mobility and overall quality of life.

Conclusion: NPNP is a rare but serious complication of weight loss surgery that can cause a range of neurological symptoms. It is important for physiatrists to be aware of this complication and to monitor patients who have undergone weight loss surgery for nutritional deficiencies. This case highlights the importance of a MDT approach in managing NPNP, particularly in patients with psychiatric comorbidities. Early diagnosis and prompt treatment can help prevent further neurological damage. This case underscores the role of nutrition as an interface between physical rehab and public health in ensuring comprehensive and effective care for patients with nutritional deficiencies.

P116

Cheshire and Mersey Rehabilitation Network (CMRN) UKROC analysis 2013-2022

G. Bavikatte (Liverpool/GB)

Objectives: To analyse the demography and rehab outcomes of patients admitted to CMRN

Population and sampling: We analysed a total amount of 2639 patients who were admitted to our Cheshire and Mersey network from April 2013 to September 2022.

Data Collection: From The UK Rehabilitation Outcomes Collaborative (UKROC) which is collected and submitted regularly

Data Analysis: We analysed the data: number of patients, age, gender, diagnosis, sub diagnosis, length of stay, discharge destination, Tracheostomy status in relation to RCS and FIM+FAM

Results: An average of 97 patients are admitted to level 1 rehab annually and 167 patients for level 2. The Majority of CMRN patients are acquired brain injury patients (71%) with stroke being the leading cause (46%), followed by trauma (35%).

A large proportion of our patients are aged 51–70 (44%) and are males (59%). 9 out of 10 tracheostomy patients are successfully weaned and are discharged to other rehab units. Patients with the tracheostomy had a longer inpatient stay and lower RCS & FIM+FAM improvement score. 64% of PDOC patients remains in PDOC state on discharge, although 87% was weaned off tracheostomy. The youngest age group of 18–30 generally have the shortest stay. The majority of our patients are discharged home (57%) while many have transferred for ongoing rehabilitation and only small proportion of patients gone to care home. Patients with peripheral neurology has the highest RCS and FIM+FAM score improvement of 3 and 40 respectively. Patients with progressive conditions has the FIM+FAM score improvement of 20. Patients with brain injury has lowest RCS improvement of approx. 2 but a FIM+FAM score improvement of approx. 35.

Conclusions: The CMRN delivered high-quality care as per the national guidelines which are evident from the improved outcome of patients

P117

Care pathways for individuals with anoxic disorders of consciousness: an intersociety consensus conference

A. Estraneo (Florence/IT, Sant'Angelo dei Lombardi/IT), A. Magliacano (Florence/IT, Sant'Angelo dei Lombardi/IT), F. De Bellis (Sant'Angelo dei Lombardi/IT), A. Amantini (Florence/IT), S. Lavezzi (Ferrara/IT), A. Grippo (Florence/IT, Florence/IT)

Introduction: After a severe anoxic brain injury, comatose patients can evolve toward prolonged Disorders of Consciousness (pDoC). Anoxic aetiology is considered to have worse outcome than traumatic brain injury,[1] and also on the basis of solid predictors of poor outcome, this often leads to withdrawn of life-sustaining therapy in the acute phase. In this perspective, few data are available about long-term care pathways for survivors with post-anoxic coma and pDoC and prognostic procedures, especially in the rehabilitative phase, have not been standardized yet.[2] Additionally, even today, the clinical diagnosis of anoxic patients in coma

or with pDoC is still challenging, because of frequent co-existence of clinical complications that hamper the recognition of behavioural sign of consciousness. On this basis, the management of such complex patients can significantly vary across countries.3 To address these issues, 9 Italian Scientific Societies shared their expertise for providing a Consensus on diagnostic and prognostic procedures, still debated in literature.

Methods: Twelve working groups, involving 22 multidisciplinary professionals from the 9 scientific societies, implemented a systematic literature review focused on 12 PICO questions addressing the acute (n=6) and the post-acute (n=6) phases. The quality of evidence of the included studies was evaluated using the Oxford Centre for Evidence-Based Medicine Levels of Evidence. In March 2023, a Jury involving representative members of the Italian scientific societies and 2 patients' family associations weigh up working groups' reports for elaborating conclusive recommendations.

Results: A total of 47 out of 1.217 screened papers have been included. Each working group produced a report on the literature review, strengths and limits of evidence for each PICO. The recommendations on the acute and post-acute phase based on literature and Jury's expert opinions will be presented at the ECNR Congress.

Conclusions: Recommendations from this Consensus Conference will guide clinicians in the management of post-anoxic coma and pDoC and hopefully could serve as a starting point for an international consensus on diagnostic and prognostic procedures for such complex patients.

References
1. Estraneo A, et al. Late recovery of responsiveness and consciousness after traumatic, anoxic or hemorrhagic long-lasting vegetative state. Neurology. 2010;75:239-245.
2. Estraneo A, et al. Prognosis in Disorders of Consciousness. In: Schnakers C., Laureys S. (eds) Coma and Disorders of Consciousness. Springer, Cham: 17-36, 2018.
3. Formisano R, et al. An International survey on diagnostic and prognostic protocols in patients with disorder of consciousness Brain Inj. 2019;33:974-984.

P118

Introducing an eye-tracker in intensive care to asssess gaze social stimuli during disorders of consciousness

A. Clerc (Lyon/FR), F. Gobert (Lyon/FR), J. Luauté (Lyon/FR), M. Beaudoin-Gobert (Lyon/FR)

Background: Disorders of consciousness (DoC) occur after cerebral injuries in strategic brain areas involved in the mesocircuit. During the recovery process after coma, patients classically regain eye-opening ability (unresponsive wakefulness syndrome, UWS) then exhibit any proof of cortical function (cortically mediated state, CMS) and finally present early communication or functional tool use (emergence from DoC). The assessment of these disorders is based on a behavioural gold-standard scale called Coma Recovery Scale-Revised (or CRS-R) to assess the state of consciousness and the functional abilities of brain damaged patients. However, several studies pinpoint a misdiagnosis rate of around 40% in distinguishing between UWS and CMS patients. Thus, it is necessary to create new tools to complete, refine and objectify the clinical assessments performed via the CRS-R. Oriented eye movement (fixation and pursuit) has been shown to be the most sensitive and early clinical signs allowing to discriminate UWS from CMS patients.

Objectives: The present study combined eye-tracking with the CRS-R assessment in order to identify different visual explorations between UWS and CMS patients.

Methods: We recruited 20 patients in an intensive care unit presenting disorders of consciousness (11 UWS; 9 CMS) after traumatic brain injury, stroke or anoxia. Patients were matched with healthy subjects (control group). All participants were assessed with the CRS-R associated with a wearable infrared eye-tracker to perform a quantitative assessment of eye movements. We measured the number of saccades and the duration of fixation throughout the CRS-R evaluation and more specifically during the presentation of : i) social stimuli : a mirror reflecting the patient's face (as classically done during the CRS-R ; autobiographical social stimulus) and the physician's face performing the assessment (non-autobiographical social stimulus); ii) non-social stimuli : two objects (visual item of the CRS-R).

Results: Our results indicates that an autobiographical social stimulus (patient's face reflected in the mirror) induced a stronger visual exploration compared to a non-autobiographical social stimulus (i.e. physician's face) and non-social related stimuli (i.e. objects), thus highlighting the importance of the autobiographical context.

P119

The effect of Virtual Reality (VR) drum beating contents according to digit memory game on the cognitive function and depressive mood

Y. G. Nam (Asan-si/KR), B. S. Kwon (Goyang/KR), S. Y. Yang (Goyang/KR), D. E. Kim (Goyang/KR), J. H. Lee (Goyang/KR)

Background: Virtual Reality (VR) cognitive training contents of playing drums was newly developed to perform the memory training for the elderly. To prevent VR sickness, head-mounted display (HMD) was excluded from the training system. The focus was on minimizing VR sickness and simply designed image that could be performed by the elderly. The content provides the realistic feeling of playing an actual drum by the controller sticks. The controller stick provides the sound and vibration of drum beating when hitting the correct number of digit memory training contents.

Objectives: The purpose of this study was to investigate effects of VR cognitive training contents on the cognitive function and depressive mood for the elderly.

Method: Fifteen elderly persons (age over 55) were included in this study and performed the VR memory training for 30 minutes each day, 3 days a week for a period of 4 weeks (Total 12 session). (Figure 1-A) Primary outcome was the change in Mini-Mental state examination (MMSE). Secondary outcomes were the changes of geriatric depression scale (GDS), number of correct answers and rate of correct answer. They underwent memory training by memorizing the number on the mirror and beating the correct number on the virtual drum. All outcomes were measured visit day 1 (V1) and visit day 12 (V12). This research protocol was approved by the Institutional Review Board (IRB) of Dongguk University Ilsan Hospital (IRB No. DUIH 2202-07-020-001) and registered on Clinical Research Information Service (CRIS, KCT0007775), Republic of Korea.

Results: Four Male and eleven females were included and the participants' average age was 61.33±4.41, height 161.13±8.33 cm and weight 61.27±6.92 kg. The MMSE improved significantly after intervention of 4 weeks. (p<0.05)(Table 1) The number of correct answers and rate of correct answer (%) were also improved significantly. (p<0.05) (Table 1) However, one participant (P6) was afraid of the mirror when

P119 Table 1. The Difference of Cognitive Functions, Depression Indexes and the contents performance

Measure	Visit 1	Visit 12	Difference	P
	Mean ± SD	Mean ± SD	(Visit 12-Visit1)	
=MMSE	26.33±2.55	28.40±1.81	2.06±2.52	0.007
GDS	9.00±5.35	5.67±5.08	3.33±6.66	0.073
Number of correct answers	19.60±11.25	39.27±8.01	19.66±14.79	<0.001
Rate of correct answer (%)	48.20	82.13	33%	<0.001

MMSE: Mini-Mental State Examination, GDS: Geriatric Depression Scale

faced with screen of VR contents after 10 minutes exercise and complaint the uncomfortable feeling of vibration when drum beating. (Figure 1-B,C) The performance level of VR cognitive training contents was not improved, and the changes of MMSE and GDS was not different between V1 and V12.

Conclusion: Cognition training with newly developed memory training by VR cognitive training contents with virtual drum can improve cognitive functions and depressive mood. This contents could provide the memory training for elderly without VR sickness.

P120

Children and adolescents with rare eye diseases need tailored rehabilitation and care pathways: the See My Life project

E. Guastafierro (Milan/IT), M. Lanza (Milan/IT), F. Incagli (Milan/IT), M. E. Reffo (Cannero Riviera/IT), A. Suppiej (Ferrara/IT), F. Parmeggiani (Ferrara/IT), H. Dollfus (Ferrara/IT), D. LeBreton (Ferrara/IT), R. Finger (Ferrara/IT), B. P. Leroy (Ferrara/IT), R. Zemaitiene (Ferrara/IT), K. Nowomiejska (Ferrara/IT), M. Leonardi (Milan/IT)

In Europe, rare eye diseases are the leading cause of severe visual impairment and blindness in children and adolescents. This sensory disability with its accompanying psychological, social, relational distress hugely impacts their lives and their families but this is often not taken into account and is not well measured. Within European Reference Network for Rare Eye Diseases, ERN- EYE, a new research project has been recently launched. The SeeMyLife project is an international multidisciplinary research project that aim to assess the quality of life of children with visual impairment due to a rare eye disease. Hôpitaux Universitaires de Strasbourg, Center for Rare Eye Diseases is the ERN- EYE and SeeMyLife Coordinator. This study involves multidisciplinary teams of professional as well as patients and their caregivers from 6 European countries (France, Italy, Germany, Belgium, Poland, Lithuania) that will use multilevel concurrent mixed method research combining quantitative and qualitative studies. The sample will include children and adolescents from 8 to 18 years old with their caregivers. Participants will be involved in semi-structured interview and in self-report questionnaires, which will investigate the vision related quality of life, wellbeing, social integration, and their feelings about clinical and social interventions. The **Results** of this study, obtained using a holistic,
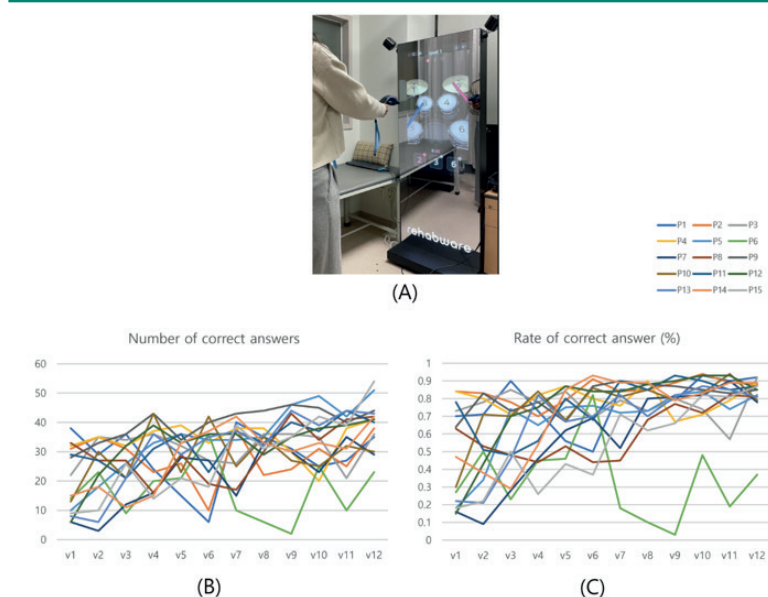
P119 Fig. 1. Progress by Visit of (A) Virtual Drum beating exercise and (B) Number of correct answers. (C) Rate of correct answers

biopsychosocial approach, should allow us to consider the environmental and family aspects related to children and adolescents with rare eye diseases that have led to severe sight loss' difficulties and to improve their quality of life. The study aims also to understand how the decision making process and the social integration and participation can be improved. Further new research is needed to define tailored care pathways and rehabilitation interventions aimed at improving the quality of life of patients with rare eye diseases. In specific in Italy there is need to increase the attention on these patients in a bio-psycho-social perspective and enlarging the multidisciplinary network of professionals dealing with this population. This is the aim of See My Life project and in two years results are expected to provide inputs in this important area.

P121

Children who survived postersior fossa tumors: eye movement parameters during reading

S. Mironets (Moscow/RU), M. Shurupova (Moscow/RU), A. Karelin (Moscow/RU)

Background: Eye movement abnormalities have the potential to impact children's development and learning significantly. In our previous research, we established that patients who survived cerebellar tumors often have saccadic impairments (e.g., hypermetria), poor gaze stability compared to normal subjects.
Objectives: We carried out the study to investigate how fixations and saccadic deficits could affect such a complex cognitive task as reading which is provided by eye movements.
Method: 84 children (12.5±2.66) survived postersior fossa tumors (remission period 46.25±34.12 month); 97 healthy children of the same age (12.9±2.74) also took part. Study design consisted of reading seven texts (36-45 words) extracted from Russian language textbooks for schoolchildren. The eye movements were recorded every 1/60 s monocularly with an Arrington eye tracking system. We analyzed the fol-

lowing measures (average for 7 texts): total reading time for each text; a number of fixations; average fixation duration; regressive saccades percentage; progressive saccade value average; progressive saccade value variance. Mann-Whitney U-test was performed to compare the cancer survivors and healthy controls. Bonferroni's correction has been applied to multiple comparisons.

Results: We revealed significant reading impairments in patients: longer reading time (U=2138, p=0.00, ES=0.808), more fixations (U=2626, p=0.00, ES=0.618) compared to healthy children. The parameter of fixation durations was differ (U=2347, p=0.00, ES=0.494). Patients had more percentage of regressive saccades (U=2440, p=0.00, ES=0.542). Children groups differed in progressive saccade value (U=2886, p=0.00, ES=0.081) and in progressive saccade value variance (U=2515, p=0.00, ES=0.236). Our findings show reading impairments in postersior fossa tumor survivors. Abnormalities in oculomotor activity such as fixation and saccades are ones that provide difficulties in the complex cognitive process of reading. Thus, these observations should be considered during neuropsychological rehabilitation processes in children treated after cancer and improve reading skills and future academic achievement.

P122
Neuropsychological monitoring of cognitive function and international classification of functioning, disability and health – mental components in patients with brain tumours

A. Pilarska (Poznan/PL), A. Pieczynska (Poznan/PL), K. Hojan (Poznan/PL)

Background: Cognitive deficits are one of the important clinical features of patients with brain tumours, which can affect up to 30–90**%** of patients before oncological treatment. The consequence is a significant and rapid degradation of the patient's cognitive and physical functioning that prevent independent functioning. This results in a reduced quality of life and a psychological crisis not only for the patient but also for their families. Maintaining the patient's function at the highest level for as long as possible is particularly important, given that long-term remission or a cure is unlikely or accompanied by significant disability.

Aim is the presentation of the neuropsychological procedure for monitoring cognitive function in patients with brain tumours, which may be helpful in developing adequate clinical practice and appropriate management procedures.

Methods: This review was applied to search across disciplines, retrieving literature from several databases (PubMed, Web of Science, and EBSCOhost).

Results: (1) discussing the methodological aspects of neuropsychological tools for monitoring cognitive function in brain tumour patients,

(2) identifying the most commonly used tools and

(3) their practical applicability according to the cognitive function components of the International Classification of Functioning, Disability and Health (ICF).

Conclusion: Cognitive impairment is characteristic of most patients with a diagnosis of a malignant brain tumour. It **Results** not only from the consequences of the tumour itself, but also from treatment-induced neurotoxicity. In addition, cognitive impairment can be divided into transient cognitive impairment, occurring immediately before and during treat-

ment as well as persistent cognitive deficits that persist long after treatment, resulting from disseminated brain changes. Currently, there are limited number of standardised, universal procedures for neuropsychological monitoring of patients with brain tumour diagnosis, which seems to be of key importance not only for the implementation of the treatment process itself, but also for the improvement of patients' quality of life.

P123
"I see the words, but i can't get them out": language complaint analysis in women with breast cancer

A. Richard (Lyon/FR, Montpellier/FR), S. Jacquin-Courtois (Lyon/FR, Lyon/FR), K. Reilly (Lyon/FR)

Cognitive problems, known as Cancer-Related Cognitive Impairment (CRCI), negatively impact quality of life and daily function in many cancer patients. One of the most frequent cognitive complaints is difficulties with language. These difficulties are currently assessed by naming and fluency tasks, which are designed for more severe disorders. This results in a discrepancy between the intensity of the complaint and scores on neuropsychological tests, often deemed normal.

In addition to hindering research, the absence of validated tools might lead to under-diagnosis of linguistic difficulties in cancer patients. We think that in-depth verbatim analysis may be a first step towards overcoming the lack of tools as it can provide detailed information on linguistic self-reported difficulties.

The aim of this study was to use an in-depth lexical analysis of the patients' verbatim to better specify the language complaint in women with breast cancer.

Nineteen patients who participated in the physical rehabilitation program Alizés at the Henry Gabrielle hospital were eligible and included in our study. The program is offered by the PMR department and is open to women who are fewer than one year after completion of adjuvant treatment for breast cancer (excluding hormonotherapy). Patients participated in a single, thirty-minute one-on-one interview with a speech therapist that included questions about language and communication. If they reported language-related difficulties, they were further questioned about the onset of these difficulties, their evolution across time, and their impact on daily life.

Interviews were recorded and transcribed by a trained speech therapist. We conducted a lexical analysis to select the target words by taking into account the context in which they occurred.

Finally, we classified the difficulties extracted from the verbatim into three themes: "lexicon" for word-finding difficulties, "syntax" for phrasing difficulties, "verbal information" for discourse difficulties.

Eighteen patients out of 19 reported a language complaint. Word-finding difficulties were the major concern (17/19) followed by verbal information concerns (11/19). Only 2 patients reported phrasing difficulties.

In line with previous studies, the verbatim analysis suggests that anomia was the hallmark of the patients' language complaint. Interestingly, our results also show that most of the patients reported difficulties with processing and retaining verbal information. This ecological method allows us to examine linguistic difficulties encountered by patients in

their everyday life. Given the lack of specific tools related to language complaint after cancer, we suggest that clinicians systematically ask patients with a cognitive complaint about their language in order to better understand their difficulties and give them the appropriate care.

P124

Median nerve to ulnar artery cross-sectional area ratio for diagnosing carpal tunnel syndrome

J. S. Yoon (Seoul/KR), J. Lee (Gyeonggi-do/KR)

Backgorund: In our previous study, we first proposed that the cross-sectional area (CSA) of the ulnar artery as a new ultrasonographic parameter and proved that median nerve to ulnar artery cross-sectional area ratio (MUAR) correlates with other CTS parameters. In addition, we found that the MUAR at forearm level is useful parameter in our pilot study. The aim of this study is to identify the value of the parameters including ulnar artery related aspects in CTS patients.
Objectives: In this study, fifty newly diagnosed CTS wrists were recruited. They have no surgical or treatment history and the diagnosis was fully based on electromyography. Also, fifty healthy wrists included.
Method and Results: We measured the median nerve and ulnar nerve in three level, including carpal tunnel inlet, carpal tunnel outlet, and 12cm proximal from wrist crease. We also evaluated the CSA of ulnar artery at the moment of fully dilated state in same three levels. Using these parameters, at all three levels, we obtain the several diagnostic parameters which are well-defined as CTS ultrasonographic findings. Furthermore, MUAR of each level was collected for analyzing the difference between CTS patients and healthy persons. In Table 1, the CSAs of median nerve at carpal tunnel inlet and outlet level were significantly larger in the CTS group than control group. Also, median nerve to ulnar nerve CSA ratio at carpal tunnel inlet was significantly larger in the CTS group than control group. In addition, the MUAR at

P124 Table 1. Comparison of ultrasonographic values among two groups

		Control group	CTS group	p-value
Median nerve CSA (mm²)	at inlet	9 (8 – 10.25)	14 (10 – 16)	<0.001**
	at outlet	9 (8 – 10)	10 (8.93 – 13)	0.002**
	12cm proximal from wrist crease	7 (6 - 8)	7 (6 – 9)	0.746
Median nerve CSA / Ulnar nerve CSA	at inlet	2.0 (1.75 – 2.75)	3.2 (2.94 – 4.5)	<0.001**
	at outlet	*	*	*
	12cm proximal from wrist crease	1.2 (1.14 – 1.53)	1.34 (1 – 1.64)	0.623
Median nerve CSA / Ulnar artery CSA	at inlet	3 (2.33 – 3.67)	3.43 (2.26 – 5.2)	0.178
	at outlet	2.67 (2.0 – 3.0)	2.71 (2 – 4.01)	0.227
	12cm proximal from wrist crease	1.75 (1.4 – 2.33)	1.47 (1.19 – 2)	0.009**
Wrist to forearm ratio of Median nerve CSA		1.67 (1.14 – 2.34)	1.8 (1.49 – 2.6)	0.156

CSA: cross sectional area; CTS: carpal tunnel syndrome
Values are presented as median (interquartile range)
* Ulnar nerve was not evaluated because it branches at this level
** Significant at p<0.05, by using Mann-Whitney U test

12cm proximal from wrist crease was significantly smaller in the CTS group than control group. In this study, we found that MUAR at forearm level can be considered as meaningful diagnostic parameter in ultrasonographic evaluation of CTS.

P125

Recovering cerebral perfusion and neural activity in the motor-related areas after CEA is associated with improvement of the gait function in patients with ICA stenosis

S. Sato (Yahaba/JP), S. Fujiwara (Yahaba/JP), K. Miyoshi (Yahaba/JP), K. Chida (Yahaba/JP), M. Kobayashi (Yahaba/JP), Y. Kubo (Yahaba/JP), K. Yoshida (Yahaba/JP), K. Terasaki (Yahaba/JP), K. Ogasawara (Yahaba/JP)

Introduction: Carotid endarterectomy (CEA) is a surgical revascularization to prevent an ischemic stroke for patients with the cervical internal carotid artery (ICA) stenosis. In some cases, CEA can improve neural activity as well as cerebral perfusion, and it has been observed as changes in motor-related areas on images obtained using 123I-iomazenil single-photon emission computed tomography (IMZ-SPECT) [1, 2] On the other hand, it remains unclear whether the changes in the motor-related area is associated with improvement of the actual motor function.
Objectives: To investigate whether recovering cerebral perfusion and neural activity in the motor-related area on IMZ-SPECT after CEA is associated with improvement of the gait function in patients with ICA steno-occlusive disease.
Patients & methods: IMZ-SPECT and quantitative assessment of gait function using a tri-axial accelerometer (MG-M1110-HW, LSI Medience, Tokyo, Japan) [3] were performed in patients with ICA stenosis (³70%) before and 6 months after CEA. IMZ-SPECT was scanned within 30 min (early) and at 180 min (late) after tracer administration for pre- and post-operatively assessing cerebral perfusion and neural activity in the motor-related area, respectively. Postoperative increase in any of three gait-related parameters (cadence, stride time or grand force reaction) was defined as improvement of the gait function in each patient.
Results: Over the course of 26 months, 68 patients satisfied the inclusion criteria. We excluded four patients, two who requested not to participate in the study, and two who were not assessed after surgery. Thus, we studied 64 patients who underwent CEA and brain 123I-iomazenil SPECT before and after surgery. Preoperative and postoperative gait testing was also performed for these 64 patients. Seven of 64 patients (11%) showed improvement of the gait function. An 86 year-old man with right ICA stenosis who showed improvement on late IMZ-SPECT images in motor-related areas improved cadence and ground force reaction in gait performance **(Fig. 1).**
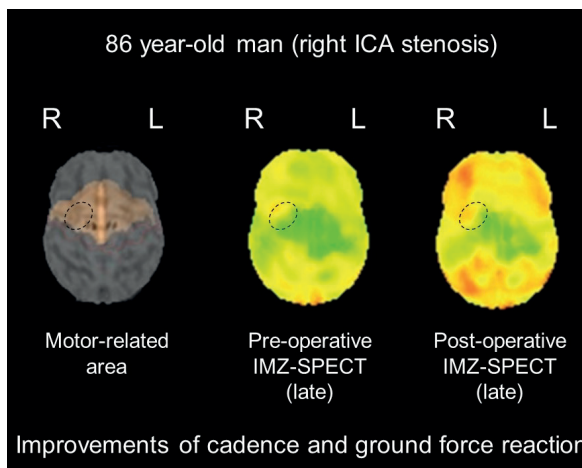
P125 Fig. 1

Logistic regression analysis revealed that post-operative increase on early (p=0.0477) or late (p=0.0173) IMZ-SPECT ipsilateral to CEA was an independent predictor for post-operative improvement of the gait function.

Conclusion: Recovering the cerebral perfusion and neural activity identified on IMZ-SPECT after CEA is associated with improvement of the gait function in patients with ICA steno-occlusive disease.Fig. 1

Reference

1. Chida K, et al. Cerebrovasc Dis, 2010.
2. Suzuki T, et al. Nucl Med Commun 2012.
3. Fujiwara S, Sato S, et al. Sensors (Basel) 2020.

P126

Feasibility study of digital neurorehabilitation for language and cognitive impairment in patients with brain damage

M. S. Müller-Mezin (Vienna/AT), T. Bloder (Vienna/AT), P. Schöllauf (Vienna/AT), M. Zusag (Vienna/AT), L. Wagner (Vienna/AT), S. Gagl (Vienna/AT), S. Pöll (Vienna/AT), M. Müllner (Vienna/AT), C. Stepan (Vienna/AT)

Background: Cognitive and language impairments are common sequelae in patients who have experienced brain damage. Traditional rehabilitation methods often require intensive, long-term care, which may not be feasible for all patients due to geographical, financial, or time constraints. Digital neurorehabilitation, facilitated by technology-based interventions, has the potential to improve accessibility and personalization of therapeutic strategies. However, its effectiveness in real-world settings remains under-explored.

Objectives: This study aims to evaluate the feasibility and preliminary effectiveness of the novel digital neurorehabilitation app "myReha" designed to address speech/language and cognitive impairments in patients with brain injuries.

Patients & Methods: Seven patients with brain injuries participated in this study, all exhibiting varying degrees of speech and cognitive impairment. The digital neurorehabilitation app, designed to provide targeted interventions for these impairments, was utilized over an 12-week period. Efficacy of the app was evaluated using the Aphasia Check List (ACL), Communicative Effectiveness Index (CETI), and the Montreal Cognitive Assessment (MoCA) before and after the intervention period.

Results: Following the intervention period, improvements were observed across all three measures, suggesting potential benefits of the app. Specifically, ACL scores indicated significant improvements in aphasia-related impairments (T1: M = 117.00; SD = 21.47 vs. T2: M = 126.86; SD = 15.59; t(6) = -3.52, p = .012), CETI scores suggested enhanced communicative capabilities (T1: M = 61.73; SD = 16.02 vs. T2: M = 74.49; SD = 13.99; t(4) = -2.47, p = .068), and although not significant MoCA scores denoted progress in general cognitive abilities (T1: M = 19.50; SD = 6.81 vs. T2: M = 22.50; SD = 4.20; p > .05). Furthermore, the app was well-received by participants, with high adherence rates and positive feedback, demonstrating its feasibility for this patient population.

Conclusion: The findings from this feasibility study support the potential of the digital neurorehabilitation app as an accessible, effective, and patient-appreciated intervention for speech and cognitive impairments post-brain injury. These promising results advocate for larger-scale studies.

P127

Feasibility and clinical effectiveness of the computer-based cognitive training program RehaCom in illiterate and low-educated individuals with Mild Cognitive Impairment

M. C. Petri (Thessaloniki/GR), L. Messinis (Thessaloniki/GR), P. Patrikelis (Thessaloniki/GR), M. H. Kosmidis (Thessaloniki/GR), G. Nasios (Ioannina/GR)

Introduction: Illiterate and/or low-educated people are at greater risk for developing Mild Cognitive Impairment (MCI) compared to people with more years of education. The clinical effectiveness of cognitive enhancement programs has been investigated mainly in literate (more than six years of education) and/or higher educated patients, while a limited number of studies have investigated the effectiveness of these programs in illiterate and/or low educated individuals with MCI.

Objectives: The purpose of the present study was to investigate both the feasibility of the RehaCom cognitive rehabilitation software program in illiterate and low-educated people with MCI and its clinical effectiveness in improving cognitive functions.

Patients & methods: In a pilot study, 20 illiterate or low-educated individuals with MCI were selected and randomly divided into an experimental (N=10) and control group (N=10). The experimental group participated in the cognitive enhancement program for six weeks, with a frequency of twice a week and a duration of 50-60 minutes for each session, while the control group did not receive any kind of intervention.

Results: The two groups were demographically matched. The experimental group successfully completed all sessions of the cognitive enhancement program. Within-subject comparison between the initial and final assessment of cognitive functions suggested that the experimental group improved significantly on all administered neuropsychological tests, in contrast to the control group, whose performance remained stable. Groups comparisons revealed statistically significant differences on the Hindi Mental State Examination, the Mini-Mental State Examination and on delayed memory and recognition, with the experimental group scoring higher compared to the control group.

Conclusions: The findings of the present study suggest the feasibility of applying computerized cognitive enhancement programs to illiterate and low-educated individuals. Moreover, these programs seem to contribute positively to improving the cognitive functions of this population. In the future, more research studies need to be conducted in larger samples and duration of treatment in this population. Control groups should also receive sham treatments (e.g., non-specific computer-based activities) in order to generalize the findings.

P128

Electroneuromyography in the early stages of Diabetic Polyneuropathy in patients with COVID-19

B. Muminov (Tashkent/UZ), R. Matmurodov (Tashkent/UZ), S. Umirova (Tashkent/UZ)

Introduction: Currently, there is a large increase in the number of cases of coronavirus infection caused by COVID-19.

The outbreak of the new coronavirus infection SARS-CoV-2 has spread to most countries of the world.

Material and Methods: The study was conducted on the basis of the RSNPMCE named after Academician Y.Kh. Turakulov. The study included 75 patients, they were divided into 3 groups: group 1 included 30 patients with type 2 diabetes who had coronavirus infection, the 2nd control group (CG) included 35 patients with type 2 diabetes who did not have coronavirus infection, and also 10 healthy volunteers. Persons included in the CG did not have a history of carbohydrate metabolism disorders, the fasting venous plasma glucose level was less than 7.0 mmol/l, glycated hemoglobin (HbA1c) was less than 6.5**%**. All examined had no symptoms and clinical signs of distal polyneuropathy (DPN). Participants were assessed for symptoms of neuropathy using the Neuropathy Symptom Score (NSS), assessed for signs of DPN using the Neuropathic Dysfunctional Score (NDS),

Results: In a group According to ENMG data, type 2 diabetes mellitus was detected in 87**%** of people who had coronavirus infection. Sensory variant of DDPN was detected in 12 patients (34.8**%**), sensorimotor neuropathy was detected in 14 (40.6**%**) patients, motor DDPN was detected in 4 patients (11.6**%**) from the control group with DM 2. The additionally examined medial and lateral plantar nerves were most often affected (p=0.017 and p=0.003, respectively). In the control group of 20 individuals, 13 (32.5**%**) showed signs of DPN in combination with radiculopathy. ENMG parameters indicative of DDPN: latency and amplitude and speed of propagation of excitation for 3 sensory (n. plantaris lateralis, n. plantaris medialis, n. suralis) and 2 motor nerves (n. peroneus, n. tibialis) were significantly worse in people with type 2 diabetes who have had a coronavirus infection, than in the CG who did not tolerate coronavirus infection, both in those examined with and without radiculopathy. Persons with type 2 diabetes who had coronavirus infection and sensorimotor DDPN had a longer duration of diabetes (p=0.503), higher HbA1c (p=0.087) and BMI (p=0.060) in comparison with those examined with type 2 diabetes and sensory neuropathy, without reaching statistical significance.

Conclusion: The data obtained indicate that COVID -19 exacerbates the manifestations of diabetic polyneuropathy in patients with type 2 diabetes. The results of the study confirmed the effectiveness and suitability of ENMG in the early diagnosis of DPN, and also made it possible to select the optimal ENMG indicators necessary for this.

P129

Beyond the wheelchair: how exoskeleton training redefines mobility and somatic sensation for incomplete spinal cord injury patients

M. L. De Martino (Paola/IT, Rome/IT), S. Tranquilli (Paola/IT), E. Leemhuis (Paola/IT, Rome/IT), A. Scuderi (Paola/IT), A. M. Giannini (Paola/IT), M. Pazzaglia (Paola/IT, Rome/IT)

Introduction. The use of assistive tools in patients with somatic deafferentation and motor deefferentation as a part of rehabilitative experience has shown significant promise in supporting processes of adaptive neuroplasticity, ultimately improving the living conditions of its users. One of the most significant benefits of such trainings is the reduction of chronic pain, which is a particularly disabling aspect for patients with spinal cord injury (SCI). Despite being unclear, the underlying mechanisms of how these trainings

alleviate chronic pain make them increasingly relevant as a nonpharmacological approach to cope with neuropathic pain.

Objective: We investigated the potential benefits of a long-term powered exoskeleton training on tactile perception and neuropathic pain in patients with SCI.

Patients and Methods: The study recruited 19 patients with complete and incomplete spinal cord lesions (below T4) and assessed their tactile threshold and neuropathic pain using a computerized pressure algometer and Numerical Rating Scale (NRS) and Neuropathic Pain Questionnaire in Spinal Cord Injury (NPQSCI), respectively. The assessments were conducted at the beginning of each training session (T0) and after 9 (T1) and 18 (T2) training sessions with ReWalk exoskeleton.

Results: Participants who lacked sensitivity to algometer pressure were excluded from the study. The results showed a significant improvement in tactile sensitivity at T1 (p<0.002) and T2 (p<.01), particularly for the lower limb. Similar results were observed for pain intensity, with a reduction exceeding 30**%** throughout all the training sessions (T1 = p<0.009; T2 = p<0.045). Moreover, a significant correlation was found between pain intensity and improvements in tactile sensitivity (r = -0.63; p = 0.04), indicating that the degree of improvement in tactile sensitivity varied as a function of pain intensity.

Conclusion: In the realm of neuroprosthetic technologies, our study highlights the potential of prolonged exoskeleton use as a promising rehabilitation alternative. Beyond improving patients' independence and functional mobility, exoskeleton training facilitates the reconstruction of a new bodily identity. By promoting adaptive neuroplasticity processes, these trainings allow SCI patients to update their altered brain-body representations, especially for the upper legs, which play a more active functional role compared to the wheelchair condition. Our findings underline the essential role of these neural mechanisms in reducing some of the most relevant clinical manifestations of SCI, including neuropathic pain.

P130

Differential aspects of the development of non-motor disorders in Parkinson's disease and Vascular Parkinsonism

R. Matmurodov (Tashkent/UZ), R. Juraev (Tashkent/UZ)

Background: Parkinson's disease (PD) and vascular parkinsonism (VP) have distinctive clinical features.

Objective: To study of differential aspects of development of non-motor disorders in PD and VP.

Material and Methods: 84 patients with various clinical forms of PD (44 men and 40 women) and 30 patients with vascular parkinsonism (16 men and 14 women) were enrolled for examination. The average age of patients with PK is 56.8±6.5 years, and in vascular parkinsonism it is 67.8±6.9 years. Non-motor disorders were assessed based on specific neuropsychological tests.

Results: 84.2**%** of the 38 patients with olfactory disorders were observed several years ago, 15.8**%** later. Of the 41 observed patients, 51.2**%** of sleep disorders appeared before movement disorders, 48.8**%** after them. 83.7**%** of patients with depression and anxiety were observed in 43, depression was the first onset, which led to the appearance of tremors

and rigidity. 16.3**%** later developed depression and anxiety. Sensory disorders in the form of pain were observed in 71.7**%** of 39 patients before movement disorders, while 28.3**%** started after them. Patients began to notice cognitive disorders almost simultaneously with movement disorders. Vegetative disorders began to be observed almost after the appearance of movement disorders (83.3**%**). Almost all symptoms in VP began to be observed after motor disorders.

Conclusion: Non-motor disorders can begin very early in Parkinson's disease, depending on where the degenerative process spreads.

P131

Embodiment of assistive tools in spinal cord injury: evidence from mental rotation tasks of wheelchairs and exoskeletons

A. Scuderi (Rome/IT), M. L. De Martino (Rome/IT), E. Leemhuis (Rome/IT), A. M. Giannini (Rome/IT), M. Pazzaglia (Rome/IT)

Background: Embodiment is a critical but underexplored aspect of human adaptation to assistive devices. Measures of embodiment can assess how well prostheses integrate into users' body schemas and improve functionality.

Methods: This study utilized a mental rotation task to evaluate the functional embodiment of wheelchair and exoskeleton devices and how spinal cord injury affects body part representation.

Twenty male participants with SCI lesions ranging from T4 to L2 were included, and measurements were taken pre and post-EXO training in two different times at baseline (T0, immediately before the start of the EXO training protocol) and after a 2-month exoskeleton training program to T1 (after the end of 10/14 EXO training). Twenty healthy participants with demographic characteristics similar to those of the clinical sample were recruited as control group.

A mental rotation task of biological (hands/feet) and non-biological (wheelchair/exoskeleton) stimuli presented on a screen in 4 different orientations (0°, 90°, 180°, 270°) was administered. Subjects had to verbally indicate the laterality (right or left) of the presented stimulus. Accuracy and Reaction times (RTs) were collected. Also, participants were asked to complete the Mental Rotation Questionnaire to inspect strategies adopted during task execution and subjective opinions on the presented stimuli.

Mixed ANOVAs on RTs considering between-group differences and within factors (type of stimulus, measurement time) were conducted. There was a significant group x stimulus interaction (p = 0.02). Post hoc comparisons revealed that healthy controls were slower than patients in wheelchair rotation (p = 0.03). Interestingly, ANOVA on RTs in the exoskeleton mental rotation shows a significant effect of time (p = 0.047) with a faster rotation time at T1 compared to T0. The significant effect of PRE/POST (p = 0.02) indicates that the time required to rotate exoskeleton images is faster (PRE=1068, POST=968) immediately after the training, indicating a brief term plasticity.

Results: The study's findings indicate that the mental rotation abilities of wheelchairs and exoskeletons can reflect their integration into users' body representations, both in the short and long term. This has the potential to yield valuable insights into how users perceive and accept assistive devices. Incorporating embodiment measures in evaluating new devices is crucial for promoting exoskeleton adoption

and informing targeted rehabilitation strategies for patients with spinal cord injuries.

P132

Alteration in brain functional connectivity in patients with post-stroke cognitive impairment during memory task: a fNIRS study

Y. Fan (Changsha/CN)

Background: Post-stroke cognitive impairment (PSCI) refers to a spectrum of cognitive deterioration following a stroke, ranging from mild cognitive impairment (MCI) to dementia. the cortical plastic alterations in patients with MCI after stroke, have not been well documented.

Objective: Using the functional connectivity (FC) technique, this study attempted to expound the neural mechanisms in individuals with cognitive impairment following a stroke.

Methods: FC was assessed by the Pearson correlation coefficient of the oxygenated hemoglobin (HbO) concentration signals measured through fNIRS. This signal was recorded from the prefrontal lobe including prefrontal cortex (PFC), left prefrontal cortex (LPFC) and right prefrontal cortex (RPFC) and motor sense cortex (LMS/ RMS) of participants in different groups.

Results: Short-term memory and visuospatial abilities were assessed using the clock drawing test (CDT), digit span test (DST), and Corsi Block-tapping (CBT) tests. The Pearson correlation coefficient analysis demonstrated strong positive correlations between MMSE scores and CDT scores (τ =0.609, P = 0.009) and DST scores (τ =0.606, P = 0.008), but not with CBT scores. Within each group, the FC between LMS and RMS was the highest, and the FC between bilateral MS (LMS and RMS) and frontal lobe (LPFC, PFC, and RPFC) was the lowest during each test (P < 0.05). Compared with HC and STR groups, the PSCI group showed decreased FC between LMS and RMS (P < 0.05) and between MS and prefrontal lobe (P > 0.05) during CDT and CBT and decreased FC between each region of interest (ROI) during DST with no significant difference (P > 0.05). The PSCI group showed significantly lower FC between prefrontal lobe channels during all three memory tests (P < 0.05). FC levels were closely related to MMSE scores (P < 0.05).

Conclusion: Decreased FC level may be a marker of impaired cognitive function in PSCI. The fNIRS-based FC provides a non-invasive method to recognize PSCI. FC changes may help to further understand the neural mechanisms of PSCI.
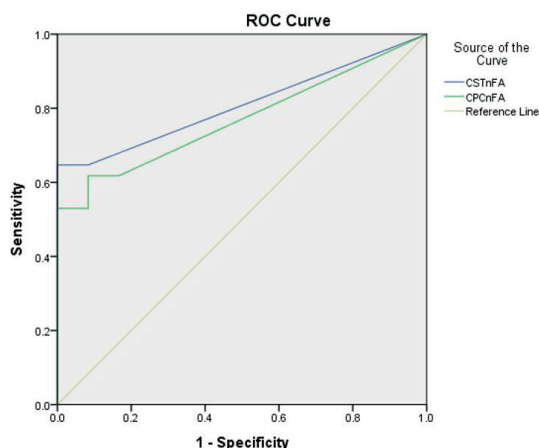
P133

Integrity of the corticospinal and cortico-ponto-cerebellar tracts reflects gait improvement in stroke patients, and there is a correlation between integrity of spinothalamic and spinoreticular tracts and ambulatory function in the presence of significant damage to corticospinal tract after stroke

Y. Ju (Seoul/KR), S. H. Lim (Seoul/KR), Y. J. Yoo (Suwon/KR), B. Y. Hong (Suwon/KR), J. I. Lee (Seoul/KR)

Background: There are many chronic stroke patients who have not improved their gait six months after stroke onset. White matter integrity in the corticospinal tract (CST) and cortico-ponto-cerebellar tract (CPCT) has been linked to recovery of upper extremity and hand function after stroke. However, their contribution to gait is not uncovered. It is also not established what role sensory tracts such as spinothalamic tract (STT) and spinoreticular tract (SRT) play in gait recovery.

Objectives: This study investigated the extent of impairment of CST and CPCT in the chronic period beyond 6 months after stroke onset and proposed cut-off values for fractional anisotropy (FA) of CST and CPCT that reflect gait function. We also sought to determine whether there is a correlation between gait recovery and the integrity of the sensory tract in cases with significant damage to the efferent tract. We examined the relationship between FAC and FA values of STT and STR in patients with severe damage to the CST tract.

Method: This was a retrospective study to determine the cut-off values for CST and CPCT that reflect gait recovery in 46 patients with FAC 0, 1, and 2 who were unable to walk within the first month after stroke onset. The patients were divided into two groups: those whose gait did not improve 6 months after stroke (n=12) and those whose gait recovered (n=34). We also retrospectively studied 38 patients with normalized FA levels below 0.5 in the CST tract 6 months after stroke onset to determine the association between sensory tract and gait recovery. Patients were divided into a group with no functional ambulation (n=9) and a group with functional ambulation (n=29) 6 months after stroke. Diffusion tensor imaging for CST, CPCT, STT and STR were investigated between 6 and 18 months after onset.

P133 Fig. 1. Significant variables of the cut-off values to distinguish the group with good ambulation from the group with poor ambulation in the ROC curve analysis.

P133 Table 1. Correlation between the FAC score and FA values of SST and SRT in patients with normalized FA levels below 0.5 in the CST tract

Tract	Values	Correlation coefficient (ρ)	p-value
SST	nFA	0.446	0.005**
SRT	nFA	0.439	0.006**

The normalized affected/cut-off value of the highest accuracy (0.809) was 0.861 for the FA in the CST. The sensitivity was 0.647 and the specificity was 1.0.
Blue line: normalized CST FA; green line: normalized CPCT FA; brown line: reference line.

Results: Normalized (affected/unaffected) FA values in the CST and CPCT were higher in the group that regained gait than in the group that did not regain gait in the chronic phase of stroke. The normalized cut-off values separating the group with good gait function from the group without gait recovery were 0.8609 for FA in the CST, and 0.7719 for FA in the CPCT. In patients with normalized FA levels below 0.5 on the CST, there was a positive correlation between normalized FA values in the sensory tracts and FAC (STT, ρSST=0.446; SRT, pSRT= 0.439). These results may be useful in identifying specific indicators that reflect gait recovery in stroke patients and in formulating effective rehabilitation strategies.

References:
1. Jang, S.H. The recovery of walking in stroke patients: a review. Int J Rehabil Res. 2010, 33, 285-9.
2. Jang, S.H. Prediction of motor outcome for hemiparetic stroke patients using diffusion tensor imaging: A review. Neuro. Rehabil. 2010, 27, 367 – 372
3. Kim Y. Integrity of the Inferior Cerebellar Peduncle Correlates with Ambulatory Function after Hemorrhagic Stroke. Journal of Stroke and Cerebrovascular Diseases, 2021, 30. 12: 106164

P134

Development of rehabilitation robot algorithm by using brainwave feedback system

H. W. Ryoo (Daejeon/KR), S. K. Bok (Daejeon/KR), H. S. Park (Daejeon/KR), S. I. Choi (Daejeon/KR), I. Doh (Daejeon/KR), W. S. Kim (Daejeon/KR), S. Y. Lee (Daejeon/KR)

Introduction: The Brain-Computer Interface (BCI) technology involves sending intentional and directional commands to a connected computer system in order to control or communicate with it, and has been applied to mild and severe disabilities in the medical field for several decades. The use of brain-robot interaction and feedback technology is required to promote treatment intensity and brain plasticity. To this end, signal processing algorithms based on brain-robot interaction technology using the brainwave activity of patients with brain lesions are needed for the damaged brain areas of users.

Methods: We developed an algorithm for detecting the characteristics of brain activity in users of a rehabilitation robot during upper limb rehabilitation training, using a rehabilitation training EEG feedback model. Additionally, we used machine learning to develop a Support Vector Machine (SVM) classifier for classifying upper limb movements based on the detected Motor Imagery/Intention brain activity characteristics. The Motor Imagery/Intention characteristics were trained using a series of processes including Motor Imagery/Action Intention/Action Execution/SVM Training. With these processes, we built a real-time upper limb rehabilitation robot system using the brain activity detection algorithm and the EEG feedback model. To confirm the

P134 Fig. 1
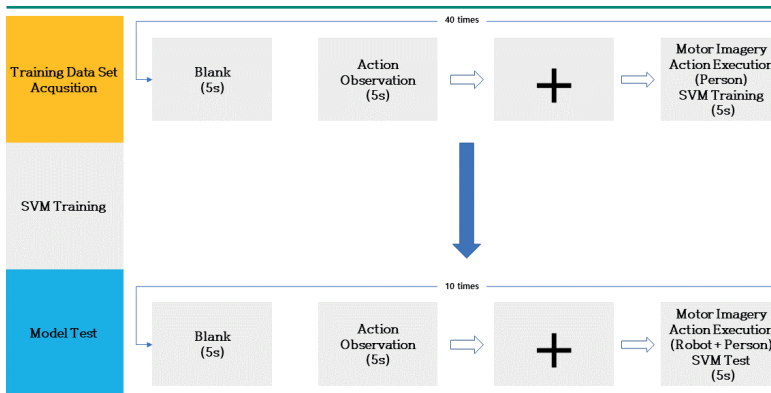
P134 Fig. 2

feasibility of the system, we conducted Grasp Task experiments on five healthy participants (four males, one female) to test the classifier's accuracy and False Positive Rate (FPR) after 40 training trials. To further stimulate brain plasticity, participants were instructed to observe the movement before imagining it.

Results: A SVM classifier was configured with Radial Basis Function as the kernel and used to classify robot movements (1) and fixation (0). The classification accuracy of the SVM classifier was 82.5**%** when tested on 5 healthy participants during a Grasp Task. When robot movements were set as the positive class, the False Positive Rate was calculated to be 7.5**%**. The time required for training the Motor Imagery / Intention model was found to be 18.95 seconds.

Conclusion: In the future, we will evaluate the potential of using the BCI system for both healthy individuals and patients with brain lesions, and improve the brain activity detection algorithm and system based on the evaluation data. Subsequently, we will conduct a clinical trial to demonstrate the effectiveness of applying the improved algorithm and BCI system to upper limb rehabilitation robots for the rehabilitation treatment of patients with brain lesions.

P135

Neuroempowerment protocols for the prevention of cognitive decline and stress management in applied contexts

M. Balconi (Milan/IT), L. Angioletti (Milan/IT), D. Crivelli (Milan/IT)

Introduction: The constant shift in employment quotas in favor of elderly professionals is strictly related to the population's ongoing aging tendency. This shift has created novel challenges for maintaining an adequate professional performance and wellbeing at work. Recent research has demonstrated the value of mindfulness-based neurofeedback interventions for professionals in terms of stress reduction and neurocognitive efficiency. However, little research has been conducted regarding the possible impact of age on the efficacy of such interventions.

Objectives: The current project has a threefold aim i) to explore age-dependent effects of a neurofeedback-based neuroempowerment protocol by comparing its outcomes in junior and senior managers, as well as to propose this protocol for ii) the neurocognitive empowerment and stress reduction in healthy samples, iii) the prevention of cognitive decline in senior professionals and elderly.

Materials & Methods: Participants in the study included 10 junior managers (JM, M-age=35.3) and 15 senior managers (SM, M-age=46.7) who underwent a rigorous 4-week daily neuroempowerment protocol based on embodied awareness techniques and wearable neurofeedback device application. Electrophysiological (event-related potentials, or ERP) measures of neurocognitive efficiency, and subjective stress levels, mood, and self-awareness were all examined throughout the pre- and post-training multimethod assessment proposed in this study.

Results: Data analysis showed that both JM and SM experienced less perceived stress following training, while the SM group also experienced less anger and mental weariness. Both groups displayed improved performance—with SM performing better—on a standardized cognitive flexibility task. They also demonstrated faster response times on a computerized Stroop task. Regarding ERP indicators of neurocognitive effectiveness, we saw a decrease in the N2 component's latency in SM and an increase in its amplitude in JM. Concerning ERP measures of neurocognitive efficiency, it was observed a decrease in the latency and an increase in the amplitude of the N2 component in SM and JM, respectively.

Conclusion: The current findings not only support the potential of intensive neuroempowerment protocols as preventive approaches to age and stress management and cognitive decline even in high-level professionals and applied contexts, but they also suggest slightly different effects and training trajectories depending on trainee age.
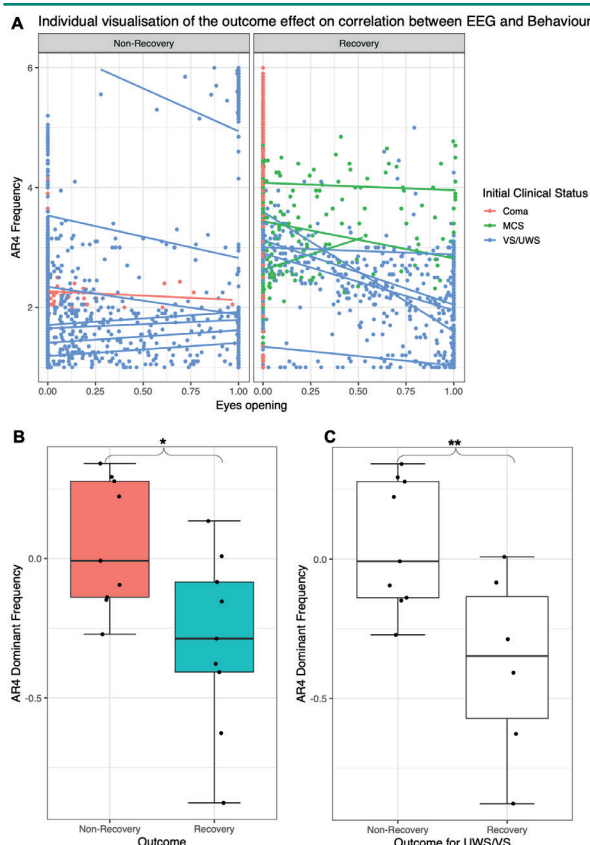
P136

Predicting coma recovery by neurophysiological transitions during eyes-opening behaviour

F. Gobert (Lyon/FR), A. Corneyllie (Lyon/FR), H. Bastuji (Lyon/FR), C. Berthomier (Paris/FR), J. Abernot (Lyon/FR), M. Thevenet (Lyon/FR), V. Raverot (Lyon/FR), F. Dailler (Lyon/FR), C. Guérin (Lyon/FR), C. Gronfier (Lyon/FR), J. Luauté (Lyon/FR), F. Perrin (Lyon/FR)

Background: Normal consciousness is characterised by a physiological sleep/wake alternation (level of consciousness) and a high level of integrated cognitive functions (content of consciousness). The harmonious relationship between these dimensions can be observed in the daily variations of behavioural clues of wakefulness (eyes-opening/closing rhythm) in phase with the neurophysiological signs of sleep and wake. After a severe brain injury, it remains to demonstrate whether the restoration of eyes-opening reflects sleep/wake cycles and to analyse the prognostic value of the congruence between behavioural and neurophysiological modulations.

Method: To analyse the correlations between neurophysiological, behavioural and hormonal circadian rhythms during coma recovery, a multimodal study was conducted in 18 acute patients, ranging from coma to the first signs of cortical functions but unable to respond to simple commands after a recent brain-injury (< 2 months). EEG recordings (24-hour) were synchronised to video recording of wakefulness-related behaviour and urinary dosages of circadian hormones (melatonin and cortisol). The EEG signal was decomposed in 21 features assessing raw signal, spectral analysis, complexity and spatial variability among 13-channels). The relations between each EEG features and eyes-opening/closing periods were compared using linear correlations at the group and patient-levels. The differential reactivity of EEG and behaviour to environmental variations (exogenous nursing, light variations and sound intensities) and hormonal dosages were analysed as well.

Results: EEG parameters were more strongly correlated to eyes opening/closure alternations for patients with a favourable outcome: eyes-opening periods were concomitant to a paradoxical increase of low frequency bands, a relative decrease of high frequency bands and a higher spatial variability in the Delta- and Alpha-bands. These differences were observed at the patient-level when considering the dominant frequency as an integrated spectral feature. The predictive value of the correlation between behaviour and the dominant frequency was synergic with the Coma-Recovery-Scale Revised at the date of recording, a usual clinical prognostic parameter. Considering every stimulus together, the multimodal reactivity of EEG (but not behaviour) was associated to outcome. Finally, the existence of hormonal circadian rhythms was associated to the multimodal reactivity of behaviour, in accordance with an environment-driven pattern of behavioural fluctuation. On the contrary, when hormonal circadian rhythms were absent, a stronger relationship between behaviour and neurophysiology was observed. Altogether, these findings illustrated the heterogeneity of coma recovery concerning the determinants of behavioural changes: the behavioural changes should be neurophysiologically confirmed to validate them as a surrogate of an actual wakefulness switch associated with a favourable outcome.

P136 Fig. 1. Individual visualisation of the outcome effect on correlation between EEG and Behaviour
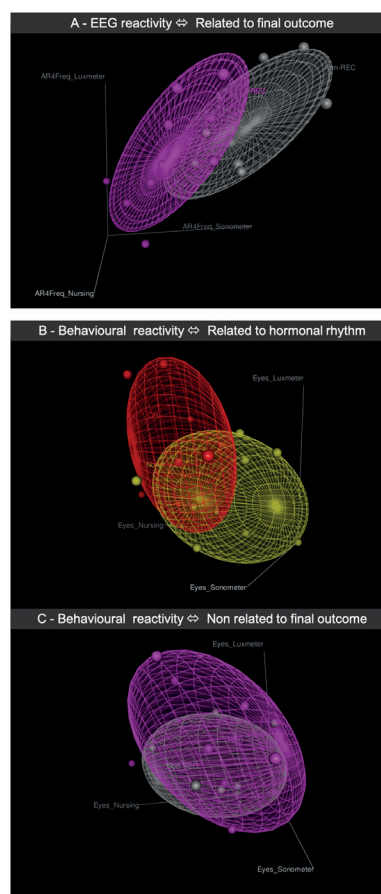
P136 Fig. 2

P137
Correlation between autonomic dysfunction and functional outcomes in acute stroke patients

S. H. Ko (Yangsan/KR), H. J. Hwang (Yangsan/KR)

Autonomic dysfunction is a common complication of acute stroke, which worsens functional outcomes and increases mortality. There is a lack of well-established knowledge regarding the influence of autonomic dysfunction in patients with acute stroke. The purpose of this study was to investigate the correlation between autonomic dysfunction and functional outcomes in patients with acute stroke, with a specific focus on examining the impact of lesion location. A retrospective analysis was conducted at a single center, involving 22 patients diagnosed with acute stroke. The severity of autonomic dysfunction was evaluated based on the Composite Autonomic Scoring Scale.The Modified Barthel Index (MBI), Berg Balance Scale (BBS), Functional Ambulatory Category (FAC), and modified Rankin Scale (mRS) were used to compare functional outcomes in this study. An experienced physiotherapist with over 5 years of experience evaluated the participants' functional ability both initially and within 6 months. The mean age of patients with acute stroke was 59.72±16.68, and among the 22 patients, 15 were male. Each group was classified as mild (n = 9), moderate (n = 6), or severe (n = 7) based on CASS. Statistically significant differences were observed among the autonomic dysfunction groups. Patients with involvement of the basal ganglia and right hemisphere exhibited a higher degree of autonomic dysfunction compared to their respective non-lesion counterparts. We compared the changes in functional outcomes among the three groups classified according to CASS. All four functional outcomes showed statistically significant differences in the amount of change among the three groups. Significant differences were observed in all four functional outcomes, including MBI, BBS, FAC, and mRS (p<0.01). This study provides evidence supporting the association between autonomic dysfunction and functional outcomes in patients with acute stroke. The findings suggest that autonomic dysfunction resulting from stroke should be conceptualized as a phenomenon influenced by the broader central nervous network rather than a strictly localized occurrence.

P138
Neurophysiological Basis of Chronic Ankle Instability: Involvement of Supraspinal and Spinal Mechanisms in Impairments and Improvements

A. Yağcıoğlu (Istanbul/TR)

Ankle sprains are one of the most common musculoskeletal injuries in sports, with lateral ankle sprains being the most prevalent type. In cases where appropriate treatment is not provided, chronic ankle instability (CAI) can develop, leading to deficits in ankle arthrokinematic motion quality, strength, proprioception, and neuromuscular control (NMC). NMC involves the subconscious processing of sensory information in the central nervous system (CNS) and the control of muscle movement through coordinated muscle activity. Damage to the ankle's ligament mechanoreceptors, which provide proprioceptive input, and the peroneal nerve, can cause alterations in the normal sensory input, leading to changes in NMC. Inflammation related to recur-

rent ankle sprains can also lead to neuromuscular deficits, resulting in impaired postural control and functional ankle instability. Research suggests that bilateral postural control deficits occur after an ankle sprain, indicating alterations in the central nervous system. However, rehabilitation for CAI can result in bilateral improvements in neuromuscular control, believed to be partly due to neural alterations at the spinal and supraspinal levels and neural adaptations in the central pathways. Cross-education, or the muscular crossed effect, occurs in neurologically healthy individuals following high-intensity unilateral resistance exercise training. Unilateral strength training of any extremity has been shown to increase contralateral homologous muscle group strength, thought to be due to increased voluntary activation through increased motor unit firing rates and recruitment via CNS mechanisms. Voluntary movements in the unilateral limb have also been shown to produce contralateral effects at the cortical region and activate the ipsilateral and contralateral sensorimotor cortex, creating a learning effect for muscle activation of the untrained extremity after unilateral training of one limb. There are neural adaptations at both spinal and supraspinal levels, with supraspinal mechanisms contributing to the untrained leg. Overall, the involvement of spinal and supraspinal mechanisms is critical in understanding the impairments and improvements in athletes with chronic ankle instability.

P139
Comparison of the EEG correlates of Visual and Vibratory feedback therapy during motor imagery in rehabilitation

A. Ahmed (Saint Etienne/FR), R. Diana (Saint Etienne/FR), P. Giraux (Saint Etienne/FR)

Introduction: Motor imagery has been shown to be effective as an adjunct to conventional rehabilitation in post-stroke rehabilitation. It can be combined with different types of sensory stimulations or feedbacks: visual (mirror therapy, video), vibratory (focal tendon vibration therapy) or combined (visual and vibratory).
Objectives: The aim of this experiment is to describe the physiological effects of individual, or combined, visual feedback (VISU) and vibratory stimulations (VIBRA).
Materials & Methods: 16 healthy volunteers performed 20 motor imagery tasks of the upper-limb during 4 conditions: motor imagery alone (MI), addition of video feedback (VISU), vibratory stimulation (VIBRA), visual feedback and vibratory stimulation (VISU+VIBRA). Their cortical activity was monitored by electroencephalography with time-frequency analysis, connectivity and source localization.
Results: In all four conditions, we observed recruitment of sensorimotor regions contralateral to the imagined limb movement. The tendon vibration (VIBRA) reinforces the somesthetic and parietal recruitment leading to a strong kinesthetic illusion. The visual feedback (VISU) leads to a recruitment of the contralateral sensorimotor regions and the reinforcement of the motor pattern. The VISU+VIBRA condition elicits EEG maps which merges individual VISU and VIBRA maps.
Conclusion: visual feedback and tendon vibration, combined with motor imagery, elicit different cortical activity maps with additive properties. These results support the combined use of these technics for motor rehabilitation.

P140

Neural basis of lower-limb visual-feedback therapy in rehabilitation: an EEG study

A. Ahmed (Saint Etienne/FR), L. Ba Tien (Saint Etienne/FR, Orléans/FR), R. Diana (Saint Etienne/FR), P. Giraux (Saint Etienne/FR), A. Pascal (Orléans/FR)

Introduction: Video-feedback Observational Therapy (VOT) is an intensive rehabilitation technique based on movement simulation. It has shown benefits on motor rehabilitation of the upper and lower limb. Subjects can perform variable motor tasks during this therapy: passive visual feedback observation, visual feedback associated with motor imagery or visual feedback associated with motor execution.

Objectives: The aim of this study is to identify compare the EEG biomarkers of these 3 motor tasks during VOT of the lower limb in healthy subjects.

Materials & Methods: EEG data (32 electrodes) of thirty-six right-handed, healthy volunteers have been recorded while performing right ankle dorsiflexion task in VOT. Three graded motor tasks associated with action observation were tested: action observation alone (O), motor imagery with action observation (I), motor execution synchronized with action observation (M). The event related desynchronization (ERD) and beta rebound (ERS) rhythms were used as a biomarker of cortical activation, and compared between conditions with a permutation test. Brain connectivity was also studied.

Results: We demonstrated a strong and comparable ERD and ERS in motor execution and motor imagery above sensorimotor electrodes (C3 – Cz – C4) and parietal electrodes. The connectivity was also enhanced and comparable in those conditions, with a recruitment of premotor cortex. The ERS ERD and connectivity changes were weaker during the observation task.

Conclusion: Our study highlights the need to practice a motor imagery or a motor execution task during VOT in order to significantly recruit the sensorimotor cortex.

P141

Effects of heart rate variability biofeedback training on anxiety reduction and its brain activity: an EEG study

R. Saito (Sapporo/JP), K. Yoshida (Sapporo/JP), D. Sawamura (Sapporo/JP), A. Watanabe (Sapporo/JP), Y. Tokikuni (Sapporo/JP), S. Sakai (Sapporo/JP)

Introduction: Heart rate variability (HRV) is a physiological index reflecting the autonomic nervous system and is associated with mental symptoms and emotional regulation. Heart rate variability biofeedback (HRVBF) is a slow breathing training that increases HRV. Recent meta-analyses have shown that HRVBF training reduces anxiety and improves depressive symptoms, indicating its clinical usefulness. However, there have been negative reports on the effectiveness of HRVBF, and no consensus has been reached on the training content, subjects, and its effectiveness. Additionally, the changes of brain activity that underlie the training effects also remain unclear.

Objectives: The aim of this study was to examine the effects of HRVBF training on anxiety reduction using electroencephalogram (EEG) and the emotional Stroop task, and to clear the changes in brain activity associated with training.

Materials & Methods: We included 52 right-handed students with severe anxiety aged 18 to 30. Participants were stratified based on sex and trait anxiety scores of State-Trait Anxiety Inventory-JYZ (STAI-JYZ), and randomly assigned to the HRVBF and control group. The HRVBF group engaged HRVBF training, and the control group did sham paced breathing training. Both groups performed 10 training sessions of 20 minutes per day within 3 weeks. The resting-state HRV and EEG, the attentional bias (reaction times of negative faces minus neutral faces) measured by the emotional Stroop task data, and EEG during the task were collected before and after the training. The attentional bias indicates that individuals with higher anxiety are more likely to pay attention to negative stimuli.

Results: HRV parameters RMSSD and HF, were significantly increased in the HRVBF group before and after training (ANOVA interactions, $F(1,38)=4.130$, $p=0.049$; $F(1,38)=9.242$, $p=0.004$, respectively). However, there were no significant changes in attention bias, STAI-JYZ, and EEG parameters. We therefore conducted an exploratory, additional analysis to determine if the training effect differed across subjects. We found that the RMSSD before the training was positively correlated with the training effect for attentional bias ($r=-0.434$, $p=0.050$) and for average HRVBF proficiency ($r=0.669$, $p=0.001$).

Conclusion: We tested the effectiveness of HRVBF by randomly assigning subjects, employing active control training, and measuring anxiety through behavioral task and EEG. Our results were negative regarding the anxiety-reducing effects of HRVBF training, showing an increase in HRV but no effect on anxiety-reduction. In additional analysis, we showed that subjects with higher HRV (i.e., higher parasympathetic activity) at the start of training were more proficient in training and had greater effects on attentional bias. These Results suggest that some subjects are more likely to benefit from the training than others, contributing to the selection of subjects and the refinement of HRVBF training.

P142

Optimizing muscle selection for needle electromyography in isolated c6 root lesion; a prospective chart review study

S. M. Rayegani (Tehran/IR), K. Aalipour (Tehran/IR), S. Maleki Kahaki (Tehran/IR)

Objectives: This study aimed to evaluate muscles with more prominent needle electromyographic findings to optimize needle EMG screening of isolated C6 radiculopathy in patients with C6 root lesions diagnosed clinically and confirmed by MRI imaging.

Methods: This prospective clinical study was conducted on 39 patients with isolated and unilateral cervical radiculopathy who were selected from all referrals of 1733 patients to the electrodiagnosis unit of the Department of Physical Medicine and Rehabilitation of Shohadaye Tajrish Medical Center, Tehran, Iran (from April 2021 to December 2021). The presence of fibrillation potentials, positive sharp waves, and/or neurogenic motor unit actional potentials in isolation or combined in selected muscles were considered abnormal findings.

Results: 39 patients from 1733 referrals were eligible and enrolled in the study, with a mean age of 49.69±9.65 years, 18 subjects (46.15%) were male and 21 subjects (53.85%)

were female. According to needle EMG findings (presence of fibrillation potentials, positive sharp waves, and/or neurogenic motor unit actional potentials in isolation or combined in selected muscles), the most involved muscles in C6 root lesion were pronator teres (100%), followed by extensor carpi radialis longus (94.8%), flexor carpi radialis (89.7%), brachioradialis (82%), infraspinatus (82%), supraspinatus (79.4%), deltoid (74.3%), biceps brachii (64.1%), extensor digitorum communis (33.3%), and triceps brachii (15.3%) muscles.

Conclusion: The pronator teres muscle is the most involved muscle of patients diagnosed with C6 radiculopathy. It might be considered the key muscle for screening and accurate diagnosis of C6 root involvement.

P143

Exceptional selective regression of anosognosia for sensorimotor deficits after a right brain damage: a case-report

H. Ardaillon (Lyon/FR), S. Ribault (Lyon/FR), Y. Rossetti (Lyon/FR), G. Rode (Lyon/FR)

Background: Anosognosia was a term coined by Babinski to denote the loss of recognition or awareness of a hemiplegia following an acute brain lesion. In the right-handed, this explicit unawareness of hemiplegia is much more commonly reported in right-brain-damaged than left-brain-damaged patients. Anosognosia may also concern sensory deficit such as hemianesthesia or hemianopia.

Objectives: To precise whether anosognosia could be dissociated and selectively impaired a function after brain damage.

Method: We report wherein the case of a woman who initially presented with a stroke and a complete anosognosia of left hemiplegia, hemianesthesia, and hemianopia. We assessed anosognosia for deficits during a period of three months post-onset by clinical examination and with the four-scale of Bisiach.

Results: Clinical examination revealed a florid left neglect for extrapersonal, but no confusion nor confabulation. Recovery of awareness of the deficits was assessed for a three-month period **(Fig. 1)**. First, anosognosia of deficits was complete one-month post-onset. Two months later, unawareness of the paralysis disappeared with a period of anosodiaphoria. Anosognosia of hemianesthesia progressively resolved during the third month, while unawareness of visual field defect remained. These results showed a
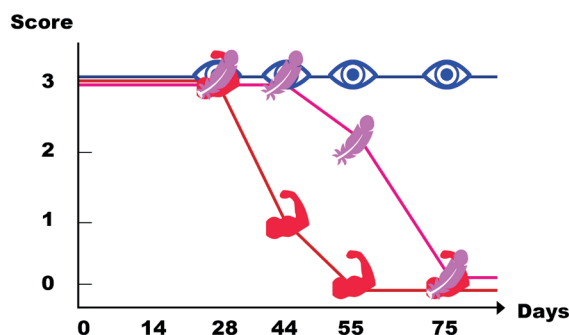
P143 Fig. 1

selective recovery of anosognosia, suggesting separated correlates for awareness deficits.

Bodily awareness may be linked to different kinds of body representations. Anosognosia of hemiplegia could be due to a deficit of higher-level motor representation related to the subjective correlates of action planning and motor intention rather than just the degree of weakness. Anosognosia of hemianesthesia may be consecutive to deficit of high-level somatosensory representation related to integration of sensory inputs in spatial left bodily representation rather than the degree of sensory deficit. Anosognosia for hemianopia may be consequent to a deficit of higher-level visual representation related to the integration of sensory input in a spatial contralesionally format. Each type of representation may be interpreted as a module associated with an awareness component. In this interpretation focal anosognosia may be interpreted as a deficit of correspondent module rather to a selective disconnection of a awareness central monitoring.

P144

Recovery of visuospatial neglect in a painter through self-portraits

C. Devignes (Lyon/FR), H. Ardaillon (Lyon/FR), S. Ribault (Lyon/FR), M. Chabert (Lyon/FR), G. Rode (Lyon/FR)

Background and Objectives: In healthy subjects, visuospatial abilities of the right hemisphere are engaged in painting. Pictorial activity can be altered after a right cerebral lesion with visuospatial neglect (VSN). The analysis of artworks of renowned artists before and after a stroke (i.e., Otto Dix) highlights anomalies due to the impairment of the spatial representation affecting size, form, perspective, or colour. We studied the recovery of these deficits through 150 self-portraits made by an artist painter for six years after a right brain damage.

Method: We report the case of a 65-year-old right-handed artist painter, presented with a stroke of the middle cerebral artery in 2016 causing left hemiparesis and VSN without left hemianopia. After the ictus, the patient resumed a pictorial activity of self-portraits. He performed each time in the same setup, in front of a mirror. From 2018 to 2022, the patient made 150 self-portraits. These paintings were compared to 2 self-portraits made before the stroke. Each portrait was loaded in ImageJ Software allowing surface measurements by three independent observers. Laterality indexes (LI) score were computed, with LI defined as : (left-sided area - right-sided area) / (left-sided area + right-sided area) (Rode et al., 2006), and quantified across time using linear regression. A positive value of LI indicates a greater left-sided surface and a negative LI a greater right-sided surface. This quantitative pictorial analysis explored neglected surface, face asymmetry and body asymmetry across time of rehabilitation.

Results: Negative manifestations were present such as unpainted surfaces, omissions, or size reduction of the left part of hemiface (LI<0). Linear regression showed significant evolution of LI across time ($r^2 = 0.29$, p < 0.0001) during the 6 years follow-up. This tendency exists as well for the face as for the whole character. LI variability was initially important and tended to decrease over time. The frequency of painting production lowered over time.

In the first self-portraits after the stroke, a noticeable asymmetry was present, corresponding to left VSN. The last

P144 Fig. 1

self-portraits suggest an exceptional and late recovery of the deficit. Interestingly, analysis of self-portraits with a mirror revealed two components of VSN: a neglect of the left side of the face (allocentric neglect) and neglect of all the left-sided area on the canvas including the whole body and the canvas' background (egocentric neglect). In this case, this freely chosen activity probably contributed to the recovery from VSN.

P145

A new ICT system for the assessment of patients with Disorder of Consciousness: a case report

F. G. Magnani (Milan/IT), S. Toffoli (Milan/IT), M. Cacciatore (Milan/IT), C. Ippoliti (Milan/IT), F. Barbadoro (Milan/IT), M. Malavolti (Milan/IT), F. Lunardini (Milan/IT), J. Navarro (Milan/IT), G. DeValle (Milan/IT), M. Lanfranchi (Lecco/IT), V. Pingue (Pavia/IT), S. Marelli (Milan/IT), L. Ferini Strambi (Milan/IT), M. Leonardi (Milan/IT), D. Rossi Sebastiano (Milan/IT), D. Sattin (Milan/IT), S. Ferrante (Milan/IT)

Background: The diagnosis of patients with Disorders of Consciousness (DoC) relies on behavioural assessment. However, some patients may not be able to perform any kind of behavioural responses due to central and/or peripheral damages, thus leading to the risk of misdiagnosis. The use of instrumental tools plays an important role in decrease the rate of misdiagnosis. For instance, the EMG allows to record sub-thresholds micro-movements not visible to clinicians.
Objectives: This work aims to present the first system, to the best of our knowledge, that integrates the recording of the EMG signal during the behavioural assessment in DoC patients. However, to date, its application is limited and barely usable during routine clinical assessments.
Materials & Methods: A new Information and Communication Technology system, named STRIVEfc, has been developed to couple the EMG recordings with the standard beahvioural assessments performed through the Coma Recovery

Scale – revised. Furthermore, we describe a case report demonstrating the usefulness to adopt surface EMG during routine clinical assessment, to detect sub-threshold micro-movements not visible to clinicians.
Results: The preliminary results highlighted some heterogeneity between the behavioural assessment and the electrical activity detected by the EMG. Specifically, during noxious stimulation and object manipulation, over-threshold activity was detected also in the stimulations where the examiner does not recognize the patient's behavioural response.
Conclusions: To combine the behavioural scales with instrumental tools is usefulness to better characterize the patient's functioning and better orienting the patients' management.

P146

Integrating cognitive and psychological assessment for patients with Cerebral Amyloid Angiopathy

M. Leonardi (Milan/IT), G. Camarda (Milan/IT), A. Mazzucchelli (Milan/IT), S. Schiavolin (Milan/IT), P. Sismondo (Milan/IT), F. Barbadoro (Milan/IT), C. Ippoliti (Milan/IT), M. Cacciatore (Milan/IT), A. Marcassoli (Milan/IT), A. Bersano (Milan/IT), I. Canavero (Milan/IT), B. Storti (Milan/IT)

Background: Cerebral amyloid angiopathy (CAA) is a cerebral small vessel disease (CSVD) characterized by progressive deposition of β-amyloid within the walls of cortical and leptomeningeal small arteries. CAA causes spontaneous intracerebral hemorrhage and dementia in elderly patients, leading to important disabilities and social burdens. Recent studies highlighted the presence of mild cognitive impairment (MCI) in CAA patients and CAA seems to be associated with cognitive impairment independently of Alzheimer's disease or other neurodegenerative pathologies. However, few studies addressed the cognitive functions and psychological outcomes of CAA patients. This study aims to define a cognitive and psychological assessment for CAA patients and integrate this evaluation within the clinical diagnosis to determine a more complete clinical profile of CAA patients.
Methods: The cognitive and psychological assessment evaluates global cognitive impairment, cognitive functions, patients' mood, subjective perception of illness, and perception of patients' clinical status. Both evaluations will be done at baseline and follow-up.
Results: Expected results will include: impaired cognitive functions, especially executive function and processing speed, a similar cognitive profile to patients with vascular cognitive impairment, and psychiatric symptoms such as behavioral problems, personality change, and depression.
Conclusions: Determining cognitive and psychological predictors of CAA progression will help to identify the prognosis of the disease and would improve patients'; recovery through the planning of specific psychiatric and psychological treatments, supportive care, and cognitive rehabilitation. This highlights the importance of integrating a cognitive and psychological evaluation for patients with CAA in the clinical practice.

P147

Eye movement indicators for unilateral spatial neglect: different research paradigms

M. Shurupova (Moscow/RU), A. Aizenshtein (Moscow/RU), G. Ivanova (Moscow/RU)

Background: One of the most common post-stroke disorders, which have not been given due attention in rehabilitation medicine for a long time, are disorders of visual functions and visual perception. After a right-hemisphere stroke, the most common disorder (developing in 25-80% of cases) is unilateral spatial neglect. Unilateral spatial neglect is an impairment of space awareness, in which patients do not perceive stimuli located in the contralateral to brain lesion hemifield of space. At the moment, there are a large number of validated pencil-and-paper tests that are aimed at identifying the symptoms of a defect: Cancellation tests (Bells test, Apples test, e.t.c.), line bisection task, copying of the object. However, pencil-and-paper tests do not provide information about the processes of visual scanning of space by the patient, about the physiology of visual attention when performing spatial tasks. The eye racking method (a modern method of registering eye movements) allows investigator to objectively assess the presence of impairments of the processes of visual attention when demonstrating certain visual tasks on a computer monitor.
Objectives: The aim of our study was to identify oculomotor patterns characteristic of the unilateral spatial neglect.
Method. The study involved 10 patients (mean age 54.5±9.8) after a right hemisphere stroke that occurred no more than a year ago at the time of examination. Patients were diagnosed with neglect by a neuropsychologist. The patients performed various oculomotor tasks: stimulus selection under conditions of competitive stimulation in both hemifields, tracing the rhythmic pattern along the contour, visual search, reading. Eye movements were recorded at 250 Hz sample rate.
Results: Patients showed a higher error rate when the target appeared on the left. All patients needed more than one fixation to fix the target. During visual search, patients missed objects on the left, and found them only when prompted. When reading, they showed skipping the left side of the lines, more fixations that were longer. When viewing the image, patients practically did not cross the middle line with their eyes, saccades to the left were hypometric and had high latencies. The eytracking method complements well-known pencil-and-paper tests methods and allows us to identify the physiology of visual attention disorders in the syndrome of unilateral spatial neglect

P148

Spanish validation of the Simplified Evaluation of Consciousness Disorders (SECONDS)

E. Noé (Valencia/ES), R. Llorens (Valencia/ES), C. Colomer (Valencia/ES), M. D. Navarro (Valencia/ES), M. O´ Valle (Valencia/ES), B. Moliner (Valencia/ES), P. Ugart (Valencia/ ES), J. Olaya (Valencia/ES), M. Barrio (Valencia/ES), J. Ferri (Valencia/ES)

Introduction: The accurate diagnosis of patients in prolonged disorders of consciousness (pDOC) is essential since this term includes patients with a very different prognosis and therapeutic response. Although the Coma Recovery Scale-revised (CRS-r), is the gold-standard clinical to assess these patients, it requires a long time and a certain degree of expertise. The Simplified Evaluation of Consciousness Disorders (SECONDS) has recently been proposed as a simplified scale (eight items and an additional index) with all the advantages of the CRS-R and a much shorter time to administer.
Objective: The objective of this study was to determine the properties of a Spanish adaptation of the SECONDS in individuals with pDOC.
Method: A total of 23 patients with a mean age of 41.57 years (SD: 16.9), admitted consecutively to a specialized neuro-rehabilitation service, with the diagnosis of unresponsive wakefulness syndrome (UWS: n=8) or minimal consciousness state, (MCS: n=15) according to their scores on the CRS-r, a mean of 313.8 (SD: 313.6) days after suffering a brain injury (traumatic: n= 14, hemorrhagic: n=3 or anoxic: n=6), were included in the study. Two bilingual translators, translated the SECONDS from English to Spanish separately. Both versions were contrasted by an experienced researcher, to provide a first version of the scale. This version was back-translated back into English by two English experts. Finally, the study researchers, in collaboration with the translators, checked the two versions until no disparities between them were found. All patients were assessed by two different investigators on the same day (in a counterbalanced manner). The first of the evaluators completed the CRS-R and the Post-Acute Leve of Consciousness (PALOC) scale. After a 60-minute break, a second evaluator assessed the patient using the SECONDS scale to assess convergent validity (Spearman) and the degree of diagnostic agreement (Kappa). On a second day, a rater blinded to the test results reassessed the patient to establish the inter-rater reliability of the SECONDS scale (Spearman).
Results: Our results showed excellent convergent validity between the global score (r=0.71, p<0.001) and the index (r=0.75, p<0.001) of the SECONDS and the CRS-R as well as the PALOC (r= 0.89, p<0.001 for the global score and r=0.87, p<0.001 for the index). The degree of agreement between the CRS-r and the SECONDS was substantial (Kappa=0.87, p<0.001), with no errors in the differential diagnosis between the UWS and MCS between the two scales. Inter-rater reliability was excellent (r=0.8, p<0.001). The administration time of the SECONDS: 7.6 (SD:1.4) minutes, was significantly lower than that of the CRS-R: 17(SD:0.5) minutes (p<0.001).
Conclusion: The Spanish translation of the SECONDS scale shows validity and reliability values that support its use in this population, especially taking into account its high degree of diagnostic accuracy and the advantage of its administration duration

P149

A machine learning analysis of the predictive value of the information gathered by the Coma Recovery Scale-Revised in determining the clinical diagnosis of individuals with disorders of consciousness

S. Campagnini (Florence/IT), R. Llorens (Valencia/ES), M. D. Navarro (Valencia/ES), C. Colomer (Valencia/ES), A. Mannini (Florence/IT), A. Estraneo (Florence/IT), J. Ferri (Valencia/ES), E. Noé (Valencia/ES)

Background: The Coma Recovery Scale-Revised (CRS-R) [1] is the most recommended bedside instrument for the diagnosis of individuals with a Disorder of Consciousness (DoC) after a brain injury and its use is increasing in clinical practice worldwide. Although its total score is commonly used for prognostic analyses, several metrics have been identified in the literature [2–5]. It is therefore unknown the best modality to exploit all this information for the improvement of the current prognosis of this population. Recent advances in Machine Learning (ML) could potentially lead to more robust and generalisable results than conventional analyses, but their application to information derived from the CRS-R is anecdotal.

Objectives: This paper aims to determine which information derived from the CRS-R administered at admission to a long-term neurorehabilitation program can provide a better prediction of the clinical diagnosis at discharge.

Methods: A cohort of 171 individuals admitted between 2004 and 2021 in 3 neurorehabilitation facilities was retrospectively enrolled. The inclusion criteria were having i) vascular, anoxic or traumatic aetiology, iii) age ≥ 16 years old, and iii) minimum stay of 3 months in the neurorehabilitation program. According to guidelines, the confounders considered in the ML analyses were age, sex, aetiology, lesion lateralisation, time post-onset, presence of epilepsy, and Disability Rating Scale, all at admission. The outcome of the ML analyses was the clinical diagnosis at discharge. The selected measures derived from the CRS-R for the ML analyses were the total score, the clinical diagnosis, the scores in all subscales, the CRS+, the CRS-R Modified Score, the CRS-R Index, and the Consciousness Domain Index (CDI). Seven ML models were cross-validated for the same outcome using all the confounders described above and only one measure derived from the CRS-R for each model as predictors.

Results: The models that considered the scores in the subscales and CRS-R Index showed the best overall performances (accuracies and F1-scores=0.65). The worst performances were found in the models including CDI and clinical diagnosis (accuracies=0.54 and 0.57, respectively, and F1-scores=0.54) **(see Table and Figure).**

P149 Table 1

	Clinical diagnosis at discharge		
	Algorithm	Accuracy	F1-score
Total score in the CRS-R	RF	0.63	0.62
Scores in the CRS-R subscales	LogReg	0.65	0.65
Clinical diagnosis	RF	0.57	0.54
CRS-R Modified Score	LogReg	0.63	0.62
CRS-R Index	RF	0.65	0.65
CRS+	RF	0.63	0.63
Consciousness Domain Index	LogReg	0.54	0.54

Conclusion: The scores in the subscales together or scores attempting in a trade-off of clinical diagnosis and total score characteristics can be the most appropriate measures for an
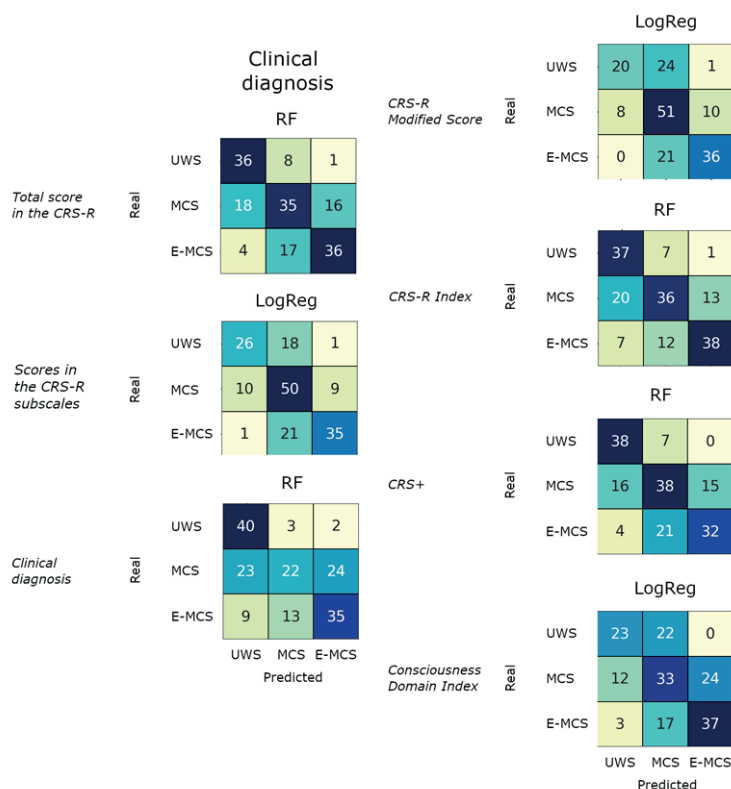
P078 Fig. 1

accurate prediction of the clinical diagnosis of individuals with DoC.

P150

### Quantitative assessment of motor neglect

S. Silvestri (Paris/FR, Saint Maurice/FR, Rome/IT), C. Bourlon (Paris/FR, Saint Maurice/FR), F. Colle (Saint Maurice/FR), M. Toba (Amiens/FR), M. Rabuffetti (Milan/IT), C. Foti (Rome/IT), P. Bartolomeo (Paris/FR, Saint Maurice/FR)

Objectives: Unilateral Spatial Neglect (USN) is a common consequence of right hemisphere damage. Neglect patients do not detect objects on the left side of space. Motor neglect is characterised by an underutilisation of one side, without defects of strength, reflexes or sensibility and it's a clinical condition whereby patients mimic hemiplegia even in the absence of sensorimotor deficits. We used differential actigraphy as a novel, **Objective** method to quantify motor neglect whose diagnosis is at present highly subjective, based on the clinical observation of patients' spontaneous motor behavior.

Methods: Patients wear wristwatch-like accelerometers, which record spontaneous motor activity of their upper limbs during 72 hours. Asymmetries of motor behavior are then automatically computed offline. On the basis of normal participants' performance, we calculated cut-off scores of left/right motor asymmetry.
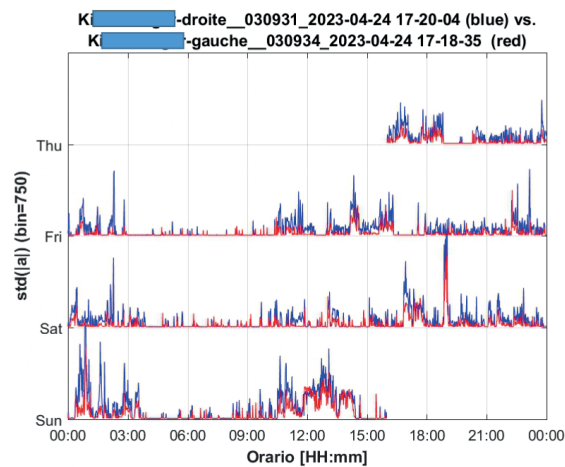
P150 Fig. 1
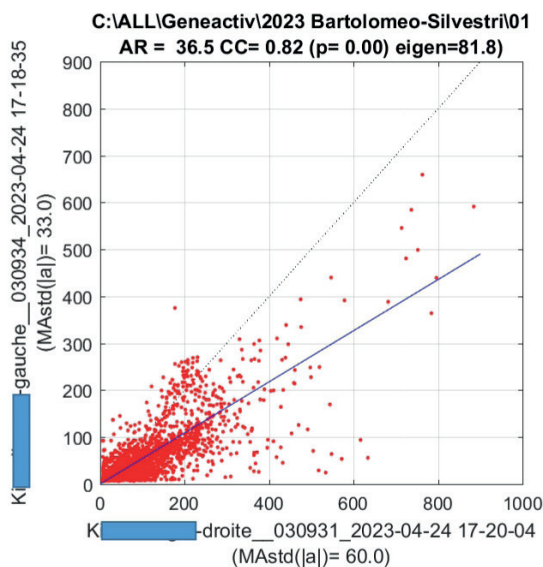
P150 Fig. 2

Results: Differential actigraphy showed contralesional motor neglect in patients with unilateral strokes, consistent with clinical assessment. Lesion location in brain MRI was highly variable, suggesting that motor neglect is a heterogenous condition.

Conclusions: Differential actigraphy provides an ecological measure of spontaneous motor behavior, and can assess upper limb motricity in an objective and quantitative manner. It thus offers a convenient, cost-effective and relatively automatized procedure for following-up motor behavior in neurological patients and to assess the effects of rehabilitation.

Keywords: actigraphy, motor neglect, attention, brain behavior relationships, stroke, rehabilitation

P151

Botulinum toxin use for spasticity: a population-based study from France

J. Lévy (Garches/FR), P. Karam (Ecully/FR), A. Forestier (Boulogne-Billancourt/FR), J. Y. Loze (Boulogne-Billancourt/FR), D. Bensmail (Garches/FR)

Introduction: Spasticity is a common complication of stroke, with a negative impact on functional activities and quality of life. Botulinum toxin type A (BoNT-A) is a first-line treatment for spasticity, injected within striated muscles at a recommended interval of 3–4 months. There are however very limited data on its real-world use in patients with spasticity.

Objectives: To determine the extent of BoNT-A use across France between 2014 and 2020, particularly in patients with stroke.

Patients & methods: In this nationwide, population-based, retrospective cohort study, we extracted data from the French National Hospital Discharge Database (Programme de Médicalisation des Systèmes d'Information, PMSI). Two subpopulations were analyzed: 138,481 patients who received ≥1 intramuscular BoNT-A injection between 2014 and 2020, and 318,025 patients who survived a stroke event between 2014 and 2016 and were subsequently followed up until 2020 **(Fig. 1)**.
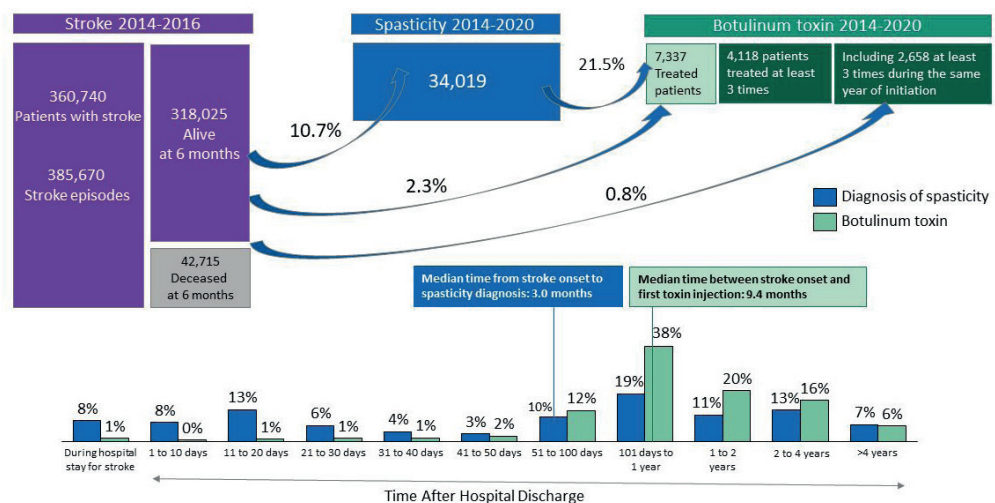
P151 Fig. 1: Care pathway of patients with stroke in French hospitals between 2014 and 2020

Results: In the 138,481 patients who received ≥1 BoNT-A injection between 2014 and 2020, 74,123 (53.5%) were treated with only 1 or 2 BoNT-A injections. Overall, 85,900/138,781 patients (62.0%) had confirmed spasticity due to central nervous system lesions. Among them, the number of patients who received ≥1 BoNT-A injection increased by a mean of 7.5% per year from 2014 to 2019, before plateauing in 2020 compared to 2019, corresponding to the COVID-19 outbreak. Of the 318,025 stroke survivors, 34,019 (10.7%) were coded with poststroke spasticity, 7,337 (2.3%) received ≥1 BoNT-A injection between 2014 and 2020, and 2,658 (0.8%) received ≥3 injections within the same year of BoNT-A initiation (i.e., once every 3–4 months) (Figure 1). With increasing age, there was a steady decrease in the proportion of stroke patients treated with BoNT-A, from 8.5% in patients aged <10 years to 0.1% in those aged ≥90 years.

Conclusion: Our analysis of the comprehensive PMSI database reflects a broad range of BoNT-A treatment practices between 2014 and 2020, most importantly low rates of BoNT-A treatment initiation and persistence in stroke survivors. Overall, this study highlights the need to improve spasticity management and care pathways in France and to match real-life clinical practice with guidelines.

P152

Goal attainment with integrated upper-limb spasticity management including botulinum toxin A (BoNT-A): Sub-analysis of Australian data from the ULIS-III study

E. Luk (Melbourne/AU), J. Olver (Melbourne/AU), R. Nunan (Brisbane/AU), I. Baguley (Sydney/AU), J. Estell (Sydney/AU), D. Marinkovich (South Yarra/AU), A. S. Grandoulier (Boulogne-Billancourt/FR), L. Turner-Stokes (London/GB)

Background: Primary results from the international ULIS-III study provided population-level evidence for the sustained functional benefit of repeated cycles of botulinum toxin-A (BoNT-A), captured through both person-centred goal attainment and standardised measures (Turner-Stokes et al., J Rehabil Med 2021). Patients with active function goals tended to require more frequent injection, and we hypothesized that reimbursement restrictions in Australia (which typically limited the number of injections received) may have adversely impacted outcomes compared with the total international cohort.

Objectives: Assess the longitudinal effects of integrated spasticity management in patients treated with repeated cycles of BoNT-A in the Australian rehabilitation setting.

Method: ULIS-III (NCT02454803) was a prospective, observational study following adults living with spasticity over 2 years of goal-directed ULS management including repeated BoNT-A treatment. We present here a post-hoc, country analysis of ULIS-III outcomes, which included Australian patients from across 9 centres.

Results: The Australian effectiveness subgroup included 115 patients (mean ±SD age 53.8 ±16.9 years, 56% male, 79% stroke aetiology, median [IQR] duration of spasticity 5.3 [15.6] years), of whom 74% had previously been treated with BoNT-A. In line with a generally restricted reimbursement policy, Australian participants (N=82 treated with same brand) had fewer injection cycles (mean 2.7±1.4 vs 4.0±1.9), with longer injection intervals (331±229 vs 213±165 days) than those in the international cohort. At 2 years, the mean overall cumulated GAS T score was 47.9. While this

indicates lower achievement than seen in the international cohort (GAS T score of 49.5), mean GAS change scores were consistently above the minimal clinical difference of ≥10 across cycles. Under-achievement was particularly marked for active function goals (mean cumulated GAS-T score 43.6), while goals for passive function and pain ranged between 48.9 – 50.9, indicating achievement as expected.

Conclusions: As anticipated, the Australian cohort had fewer injection cycles with longer injection intervals. Their overall goal attainment was lower, especially for active function goals. Amongst other possible factors, these data support the idea that restricted reimbursement may have impacted BoNT-A injection frequency, and consequently, patient outcomes.

P153

Development of a tool in Hindi language to assess communicative skills in individuals with right hemisphere damage

S. Palrecha (Mumbai/IN), J. Mohite (Mumbai/IN)

The most common deficits observed in individuals with RHD are attention, neglect, perception, learning/memory, and certain communication-related aspects. These deficits are not identified using conventional tests for aphasia as they are mostly encountered in social situations. Because of this, these deficits are under-looked. To the best of the researcher's knowledge, there is a dearth of validated instruments for the assessment of communicative deficits in individuals with RHD, especially in Hindi despite it being the most spoken language in India. Some available communication batteries are taxing. This observational exploratory study aimed at developing a tool in the Hindi language to assess communicative skills in individuals with RHD. The developed tool consisted of 4 domains namely Lexico-semantic, Prosody, Discursive, and Pragmatic. The stimulus consists of written content as well as audio and video recordings. A screener to be administered before the tool was developed assesses Visuospatial skills, Hemi-neglect, and Executive functions. 10 individuals with RHD and 34 typical individuals who speak Hindi and are within the age range of 20–60 years were recruited. Item analysis of the developed tool was done. Age and gender effect was analyzed across the control group. Validity and reliability were also computed. Statistical analysis and the cut-off were computed. Significant clinical and statistical differences across all the domains were
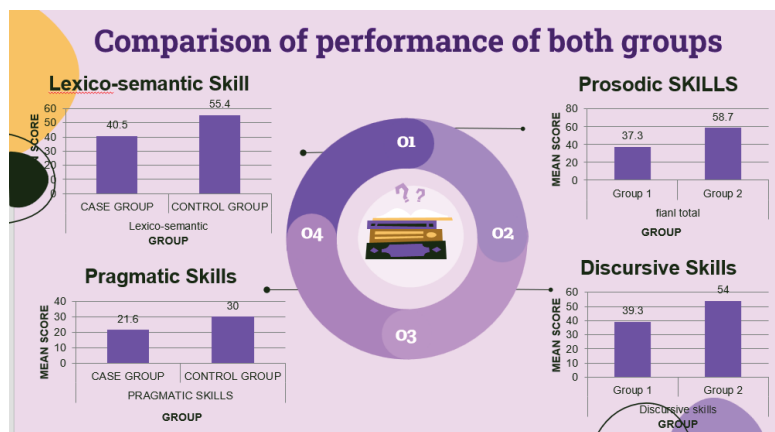
P153 Fig. 1

noted among both groups. This study provides the communication profile of 10 individuals with RHD with one of them using AAC to respond. A significant difference among the communication profiles was noted depending on the etiology. Conclusively, it will aid SLPs to assess, diagnose, and further planning intervention programs for individuals with RHD.

P154

Feasibility of the intensive cognitive rehabilitation programme in patients with acquired brain injury: pilot study

M. Krivosikova (Prague/CZ), J. Horynova (Prague/CZ), Y. Angerova (Prague/CZ)

Background: Cognitive rehabilitation has taken on a number of varying forms regarding intensity, staff involved and interventions. Increased levels of cognitive activity may improve general cognitive functioning in patients after acquired brain injury (ABI) and potentially increase their engagement in different aspects of their daily life.

Aims: To determine the feasibility of an intensive 4-week therapeutic program of cognitive rehabilitation and its acceptability for patients after ABI in an outpatient program at the Day Centre of the Department of Rehabilitation Medicine at the General Hospital in Prague.

Methods: A descriptive design was chosen for the pilot study. A 4-week intensive therapeutic program focusing on retraining cognitive function was designed and implemented. The programme was scheduled 6 hours a day including individual or group therapy. For identifying and quantifying individualized treatment goals we use Goal attainment scaling. Therapy included functional and compensatory approach as well as computer-based therapy. A total of 7 adults after acquired brain damage were enrolled in the pilot program. Cognitive performance was evaluated with Short neuropsychological battery in the following cognitive domains: memory (immediate recall, delayd recall and recognition), attention, executive functions, language and visuo-spatial functionsj. ADL was assessed with FIM at the beginning and at the end of the program. Subjective memory functioning was assessed with Multifactorial Memory Questionnaire.

Fig 1. free-viewing VR-based task   Fig 2. Short VR-based spatial-selective attention task

P154 Fig. 1

Outcomes, Results and implications: The pilot study provides some evidence that it is feasible for patients with ABI to receive standardized cognitive rehabilitation. After the completing the programme patients experienced less impairment in daily activities and in some cognitive domains. Based on clinical experiences, goal setting is less feasible in patients with lack of insight. Patients were satisfied with the intensity, content and level of difficulty of the tasks in the therapy program.

Keywords: cognitive function, cognitive training, goal attainment scaling, acquired brain injury, interdisciplinary team

P155

Eye tracking in virtual reality as a measure of attentional deficits in brain damaged patients

H. Perrin (Lausanne/CH), L. Catinari (Cesena, Bologna/ IT), D. Zeugin (Lausanne/CH), N. Farron (Lausanne/ CH), S. Crottaz-Herbette (Lausanne/CH), D. Perez-Marcos (Lausanne/CH), J. Fellrath (Lausanne/CH), A. Serino (Lausanne/CH)

Introduction: Attention is a fundamental cognitive process that can be severely affected by brain lesions, such as stroke. Among the impacted attentional components, alertness and spatial attention are frequently impaired. Alertness (both tonic and phasic) is a prerequisite of all the other attentional components, thus impacting their functioning. Spatial attention deficits, including neglect, are best predictors of long-term poor functional outcome in the first year after stroke.

Current available tools for the diagnosis and rehabilitation of attentional deficits are based on computerised or paper-and-pencil tasks. Immersive Virtual Reality (VR) has been recently proposed both as a tool to improve diagnosis and to alleviate cognitive deficits. Eye-tracker sensors embedded in VR allow the collection of parameters known to be biomarkers of attention capacity.

Objectives: First, to assess the validity of eye-tracking markers during a VR-based free-viewing exploration task (Fig.1.1) for assessment and monitoring of alertness and spatial attention deficits in brain-lesioned patients.

Second, to analyse the evolution of both behavioural and eye-tracking components by means of a novel battery of VR-based short tests (Fig.1.2, MindFocus, MindMaze SA) during the course of a rehabilitation program, and compare them to the standard Test of Attentional Performance (TAP).

Patients & methods: We collected data from a group of 20 acquired brain-injured patients with attentional deficits. The group underwent a VR-based rehabilitation protocol consisting of 4-5 weekly 45-min training sessions over 4 weeks, in addition to standard of care. Patients performed TAP and VR-based tests at baseline, at week 2 and after completing the rehabilitation protocol.

Results: Multiple eye-tracking parameters, including total fixation duration, fixation stability and mean blink duration correlated significatively with the clinical diagnosis as well as with the standardised attentional tests.

Conclusions: Eye tracking during free-viewing and VR-based short tests can be as effective as time-consuming standardised batteries in assessing alertness and spatial attentional deficits in brain-injured patients.

P156

Investigating the feasibility of closed-loop transcranial Alternating Current Stimulation (cl-tACS) to probe the role of cortical mu-rhythm oscillations on motor control and motor recovery

A. Colucci (Berlin/DE), D. Haslacher (Berlin/DE), M. Vermehren (Berlin/DE), S. Soekadar (Berlin/DE)

Sensorimotor mu-rhythm (8–13Hz), which can be assessed over sensorimotor scalp regions in the electroencephalogram (EEG), plays an important role for motor planning and execution. It is, however, still debated how cortical mu rhythm oscillations influence cortico-spinal neural communication, and how this is related to motor control and motor recovery, e.g., after stroke.

Non-invasive Brain Stimulation (NIBS) techniques are a promising tool to directly modulate and probe brain oscillations noninvasively, offering the possibility to uncover the underlying mechanisms of neurophysiological activity and improve clinical outcomes in pathological conditions. Due to its rhythmic stimulation signal, transcranial Alternating Current Stimulation (tACS) is particularly well suited to modulate physiologically relevant brain oscillations, to enhance our understanding of brain rhythms. It has been shown that the efficacy of tACS to modulate rhythmic cortical activity in humans is brain-state and specifically phase-dependent. Thus, a closed-loop, i.e., phase-dependent, modulation of mu-rhythm oscillation over the motor cortex is a pre-requisite to effectively target and probe mu cortical oscillations in stroke survivors.

For this purpose, we have developed a system for closed-loop phase-specific neurostimulation and tested its feasibility on healthy human participants, targeting mu-oscillations in real-time via transcranial alternating current stimulation delivered at 6 different phases. We were able to show that, as envisioned, our experimental setup enables millisecond-to-millisecond precise detection of ongoing mu-rhythm oscillations, real-time removal of stimulation artefacts, and specific phase targeting. This pilot study confirms the feasibility of using closed-loop non-invasive brain stimulation to target mu-oscillations over the motor cortex. Furthermore, it paves the way to the application of closed-loop tACS to deepen our understanding of the motor system and investigate the causal role of mu-oscillations on motor control and motor recovery in stroke survivors.

P157

Amount of daily time spent in rehabilitation in stroke in/outpatients: a French rehabilitation center study

A. G. Grosmaire (Boissise-le-Roi/FR), O. Pila (Boissise-le-Roi/FR), P. Breuckmann (Boissise-le-Roi/FR), C. Duret (Boissise-le-Roi/FR)

Introduction: Stroke is the leading cause of disability worldwide. Stroke rehabilitation guidelines recommend to offer patients 3 hours of daily rehabilitation program to optimize recovery. However, does actual daily practice fit with these recommendations in a typical French specialized rehabilitation center?

Main Objective: The purpose of this study is to provide a quantitative and qualitative description of daily interventions offered to stroke in/outpatients.

Methods: This cross-sectional study was carried out in a French rehabilitation approved for rehabilitation to neurological disorders. All Patients with stroke who were hospitalized on a given date, selected as representative, were eligible for inclusion in the study. Data such as demographic characteristics (age, gender, side of lesion etiology and phase of stroke, severity, phasic or cognitive impairment), type of hospitalization, amount and type of prescribed training, were extracted from patient's medical records.

Results and Discussion: Data from 104 stroke patients were analyzed. The study sample had a mean age of 62.7 years; 51.0% were men and 71.2% had an ischemic stroke. Mean total daily time spent in rehabilitation was 122 minutes ±49 consisting in approximately 2.5 sessions. Inpatients were inactive 73% of the day. The type of hospitalization (inpatient or outpatient), and patient characteristics did not significantly impact the daily time spent in rehabilitation.

Conclusion: We found that the **Results** of this study were consistent with literature, and not adequate with the 3 hours per day guidelines. However, to date, the real needs of stroke patients to optimize recovery are not established, although current rehabilitation programs might be under-dosed.

P158

Increased rate of chest CT-angiography diagnostics during pulmonary hypertention among acute ischemic stroke patients and it's association with previous COVID infections

T. Janelidze (Kutaisi/GE), G. Barbakadze (Kutaisi/GE)

Background: Coronavirus is often associated with cardiovascular complications such as pulmonary hypertension, which is one of main diagnostic criteria for administering advanced radiological studies in pulmonary embolism (PE) diagnostics. Together with stroke, PE can be serious and life-threatening condition.

Methods: We evaluated pre-covid (2018-2019) and covid-period (2020-2021) hospitalized acute ischemic stroke patients (485 and 500, respectably) transthoracic echocardiography (TTE) **Results** in correlation with D-Dimer levels and Chest CT-angiography in pulmonary embolism diagnostics. All of 2020–2021 acute stroke patients evaluated had previous anamnesis of COVID-19 infection.

Results: 3.9% (19) of pre-covid ischemic stroke patients had PH and 73% (14) of those had elevated D-Dimer. All patients with elevated D-Dimer underwent Chest CTA. All of them had pulmonary embolism diagnosed.

In comparison with pre-covid acute ischemic stroke patients, 31% (155) of patients with previous COVID infection in anamnesis had pulmonary hypertension on TTE. D-Dimer was elevated in all patients with pulmonary hypertension. Chest CTA was done in all of 155 patient and study showed pulmonary embolism in 14.8% (23).

Conclusions: Due to previous COVID-19 infection, more patients had pulmonary hypertension and elevated D-dimer levels. Elevated PH and D-dimer levels, associated with previous COVID infection were associated with excessive Chest CTA scans were performed.

Discussion: According to this data, additional discussion and further evaluation is needed in order to decrease number of excessive high-technology radiological studies such as chest CTA and increase diagnostic effectiveness of this study in PE detection.

P159

International classification of functioning, disability, and health (ICF) based factors influencing post stroke social participation: the Korean stroke cohort for functioning and rehabilitation (KOSCO) study

J. Choi (Yangsan/KR), Y. I. Shin (Yangsan/KR), S. H. Ko (Yangsan/KR), J. S. Baek (Yangsan/KR)

Objective: Social participation is a key component of successful and health aging in response to concerns about population aging. To identify the factors influencing the social participation of persons with stroke 12 months after stroke onset.
Method: This study analysed the data of 994 persons with stroke with functional independence from the Korean Stroke Cohort for Functioning and Rehabilitation study. Social participation was assessed using the Reintegration to Normal Living Index. All other variables including characteristics of the persons with stroke and their caregivers at 12 months using the International Classification of Functioning, Disability, and Health as a conceptual framework were assessed. Multivariate regression analysis was performed to analyse factors that potentially influenced social participation 12 months after stroke. The inclusion criteria were first-ever stroke with a corresponding lesion on magnetic resonance imaging/angiography, age ≥19 years, dwelling in the community, normal or slightly altered motor function at 12 months with a Fugl-Meyer Assessment (FMA) score of >95, normal cognitive function with a Korean Mini Mental State Examination (K-MMSE) score of >24, absence of depression with a Geriatric Depression Scale-Short Form (GDS-SF) score of <5, and an understanding of the purpose of the study and provision of consent to participate. The exclusion criteria were transient ischaemic attack and recurrent stroke.
Results: The frequency of social participation was higher in persons with stroke with functional independence. Multivariate regression analysis showed that religion, alcohol consumption, swallowing function, psychosocial stress, activities of daily living, aerobic exercise, driving, quality of life, housing type, caregiver age, caregiver type, and caregiver burden had a significant association with social participation 12 months after stroke.
Conclusion: Social participation of persons with stroke is associated with variables from all ICF framework components. These key variables should be taken into consideration when planning rehabilitation for persons with stoke.

P160

Correlation between skeletal muscle index and pulmonary function in stroke patients

H. I. Moon (Seongnam-Si/KR), J. W. Lee (Seongnam-Si/KR), M. K. Ma (Seongnam-Si/KR), J. H. Jung (Seongnam-Si/KR)

Background: Sarcopenia is caused by aging process and is an important issue in old age population. Stroke usually occurs in old age population, which means high probability of having sarcopenia as an underlying. However, sarcopenia also can be caused by stroke itself, so it is important to evaluate and manage sarcopenia in stroke patients. There are variety of ways to assess sarcopenia, such as hand grip strength, gait velocity, and skeletal muscle index.

Objective: In this study, we aimed to investigate the correlation between skeletal muscle index measured by Dual-energy X-ray Absorptiometry(DEXA) scan as a coefficient of stroke induced sarcopenia and pulmonary function in stroke patients.
Method: We retrospectively reviewed hospitalized patients between 2019.1.1 and 2022.6.20 with first-ever stroke and without any existing pulmonary disease before onset. We included patients who can perform more than 2 commands, and having score higher than 10 on Korean-Mini Mental State Examination(K-MMSE), and excluded traumatic injury patients, and those who couldn't sit alone. 70 patients of those patients underwent DEXA scan and pulmonary function test. Skeletal muscle index was measured with DEXA. And the parameters of pulmonary function were measured with the Forced Vital Capacity(FVC), First second of Forced Expiration Volume (FEV1), Maximal Expiratory Pressure(MEP), Maximal Inspiratory Pressure(MIP), Peak Cough Flow(PCF) of pulmonary function test. We use COSMED Pony FX Desktop Spirometer® as spirometer for pulmonary function test. Pearson's correlation coefficient and linear regression coefficient were used to analyze the correlation between skeletal muscle index and parameters of pulmonary function.
Results: FVC, FEV1, MEP, MIP, PCF in stroke patients showed significantly high correlation ($p<0.05$) with skeletal muscle index in Pearson's correlation analysis. Simple regression analysis performed with skeletal muscle index and pulmonary function parameters showed linear relationships similar to Pearson's correlation analysis. Partial correlation of skeletal muscle index and pulmonary function parameters adjusted by age, BMI, MMSE also showed high correlation ($p<0.05$).
Conclusion: Skeletal muscle index of stroke patients was related with result of pulmonary function. We could find out pulmonary function was affected by skeletal muscle index, a parameter related with sarcopenia. And we suggested that skeletal muscle index is important variable for expecting pulmonary function and further outcome, such as pneumonia, pulmonary deficit, furthermore Activities of Daily Living(ADL) of stroke patients.

References:
Martínez-Luna N, Orea-Tejeda A, González-Islas D, Flores-Cisneros L, Keirns-Davis C, Sánchez-Santillán R, et al. Association between body composition, sarcopenia and pulmonary function in chronic obstructive pulmonary disease.BMC Pulm Med 2022;22:106

P161

Impact of patient input on the study execution of a prospective, epidemiological study assessing the proportion of stroke survivors who develop problematic post-stroke spasticity

S. Pröschel (Gruenwald/DE), S. Butet (Rennes/FR), A. Picelli (Verona/IT), L. Serrano Barrenechea (Borås/SE), S. Groppa (Mainz/DE), D. Hernández Herrero (Madrid/ES), R. Prasad (Leicester/GB), S. Sandars (Gloucestershire/GB), S. Page (Slough/GB), P. Maisonobe (Boulogne-Billancourt/FR), R. D. Zorowitz (Washington, DC/US)

Background: While there is good evidence on the overall incidence of post-stroke spasticity (PSS), little is known about how many patients develop "problematic" spasticity that would benefit from pharmacological treatment, and how early this develops.

Objectives: Epitome is a prospective, observational, epidemiological study designed to evaluate the proportion of stroke survivors with paresis who, within 1 year of their stroke, develop "problematic" PSS that would benefit from pharmacological therapy. Patient and care partner experts provided feedback on the study protocol at two virtual meetings.

Method: The study will follow participants (18-85 years old) from 7 countries presenting with paresis ≤2 weeks of a first-ever stroke that has occurred within ≤4 weeks. Participants are monitored remotely at 2 weeks, 1-, 2-, 3-, 6-, 9- and 12-months post stroke to detect the onset of PSS using the Post stroke Spasticity Monitoring Questionnaire (PSMQ) (Zorowitz et al, 2017). If a patient is enrolled past any of these timepoints, their next timepoint is recorded. If the PSMQ indicates the possible presence of spasticity, patients undergo a full in-clinic assessment to confirm onset of PSS; patients without clinically confirmed PSS return to monitoring. For patients with confirmed PSS, the investigator will assess whether the patient has "problematic" spasticity that could benefit from pharmacological therapy. Treatment plans will be documented including the reasons for treatment decisions.

Results: Based on patient feedback, the recruitment period was extended from 2 weeks to 1 month after the stroke event to offer patients and their caregivers more time to consider whether participation in the study was right for them. The PSMQ was edited for plain language and the **Methods** for remote data collection were broadened to allow participants the choice of remote monitoring by telephone calls or electronic questionnaire completion (by themselves or with caregiver assistance, depending on their ability to use equipment and personal preferences). Patients endorsed the study definition of problematic spasticity "Spasticity that causes patient impairment, impact on daily functioning, and/or impact on participation" as meaningful to patients.

Conclusions: Results from this study will provide vital information on the incidence of problematic PSS. Patient input on the protocol will aid recruitment and make study participation easier for patients living with PSS.

P162

Impact of the psychosocial background on the outcome of rehabilitation after stroke

C. N. Nguyen (Brussels/BE), M. D. Gazagnes (Brussels/BE), A. M. Bulinckx (Brussels/BE), G. Volpe (Brussels/BE), K. Briquet (Brussels/BE), D. Vander Perre (Brussels/BE), A. Ourtani (Brussels/BE)

Introduction: After suffering from a stroke, it is known that certain medical and physical factors predict the outcome of a patient's rehabilitation(1),(2). However, not many studies have been conducted detailing the impact of a patient's psychosocial background on the rehabilitation results.

Objectives: The aim of this study was to investigate the impact of a patient's psychosocial background, such as education, ethnicity and social environment, on the outcome of rehabilitation.

Material & Methods: This study was a prospective, single-center and observational study conducted at the Brugmann University Hospital in Brussels, Belgium. Patients with stroke hospitalized from 24/08/2020 to 30/11/2020 were included and had a medical follow-up of 5 months or less depending on whether they were discharged before that

timeframe. Three scales were used to measure the **Results** of rehabilitation: Modified Rankin Scale, Barthel Index (BI) and Functional Independence Measure (FIM). Another criterion taken into account was whether the patient was able to return home or was still hospitalized at the end of the 5 month study.

Results: Thirty-two patients were included in the study. A non-significant difference was measured regarding the BI and the FIM between patients at the beginning and end of the study, due to small sample size. Despite this difference, a tendency was observed for socially isolated patients to return home against medical advice (p=0.078). In the same way, the proportion of discharge against medical advice was higher in patients of foreign origin and those who had no higher education diploma.

Conclusion: The impact of psychosocial factors on the outcome of rehabilitation after stroke was observed, showing a tendency to return home against medical advice mainly in socially isolated patients, most of whom had a low education attainment and were of foreign origin. These **Results** draw attention to the vulnerability of these latter groups, suggesting that more resources are needed to improve the outcome of these patients, with emphasis on better follow-up. Because this study had a small sample size, the results should be confirmed in a large-scale trial.

References:
1. Winstein CJ, Stein J, Arena R, et al. Guidelines for Adult Stroke Rehabilitation and Recovery: A Guideline for Healthcare Professionals From the American Heart Association/American Stroke Association. Stroke. 2016;47(6):98-169.
2. Harvey RL. Predictors of Functional Outcome Following Stroke. Phys Med Rehabil Clin N Am. 2015 Nov;26(4):1-16.

P163

The Berlin Bimanual Test for Stroke (BeBiTS): a new measure of bimanual function for stroke survivors compatible with assistive hand exoskeletons

M. Vermehren (Berlin/DE), A. Colucci (Berlin/DE), C. Angerhöfer (Berlin/DE), N. Peekhaus (Berlin/DE), S. Soekadar (Berlin/DE)

Introduction: Brain/neural exoskeletons (B/NEs) are promising tools for restoration of motor function after severe stroke, and can restore bimanual tasks in daily life activities. However, reliable clinical tests for assessing bimanual function after stroke compatible with the use of B/NEs are missing, so far. In response, we introduce the Berlin Bimanual Test for Stroke (BeBiTS), a performance-based test consisting of 10 bimanual tasks relevant to the daily life of stroke survivors. The score reflects the main components of bimanual function in activities of daily living, i.e., reaching, grasping, manipulating, and lifting. Here, we evaluate the test's psychometric properties and assess its' sensitivity to detect change in B/NE application.

Method: 18 stroke survivors (mean age 59.3 ± 16.1 years, 6 female) with upper-limb hemiparesis after stroke were assessed with the BeBiTS (baseline). For evaluation of the psychometric properties, agreement in scores among 3 independent raters was tested with the intraclass correlation coefficient (ICC). Further, construct validity was assessed by correlating baseline BeBiTS scores with the Chedoke Arm and Hand Activity Inventory (CAHAI). To evaluate the sensitivity to assess change bimanual function induced by B/NE applications, 9 stroke survivors (mean age 52.0 ± 15.5 years, 2 female) repeated the BeBiTS assisted by a B/NE (inter-

vention). The order of conditions was randomized across participants. Online B/NE control was achieved through a hybrid brain-computer interface translating electroencephalography (EEG) and electrooculography (EOG) signals into exoskeleton opening or closing motions.

Results: The BeBiTS showed excellent interrater reliability in both baseline (ICC of .99, p < .001) and intervention (ICC of .92, p < .001) conditions. The BeBiTS baseline score strongly correlates with the CAHAI score (r = .94, p < .01). The BeBiTS score improved significantly between baseline (Mdn = 31) and intervention (Mdn = 77, p = 0.025), evidencing the test's sensitivity to change in B/NE application.

Conclusion: The BeBiTS is a reliable and valid test for evaluating bimanual task performance in stroke survivors. The test is compatible with assistive hand exoskeletons and sensitive to assess B/NE-related improvements in bimanual task performance.

P164

Reducing length of stay of post-stroke patients in the rehabilitation ward of Alexandra Hospital

L. Lua (Singapore/SG), P. Su (Singapore/SG), M. Lim (Singapore/SG), Z. T. Tan (Singapore/SG), V. Paulin (Singapore/SG), E. Chew (Singapore/SG)

Background: In Singapore setting, stroke patients are transferred from acute hospital to tertiary inpatient rehabilitation unit, such as Alexandra Hospital (AH). Thereafter, patients are discharged to their home after caregiver training (CGT), home modifications and equipment prescriptions. Outpatient rehabilitation services are recommended and applied for on discharge.

Data from a rehabilitation unit in Singapore showed that the mean length of stay (LOS) of stroke patients was 18 + 10 days.1 However, post-stroke patients admitted to AH rehabilitation ward had a mean LOS of 31.3 days in 2021.

As prolonged hospitalization increases risk of nosocomial infection, restricts bed availability, and increases utilization of healthcare resources contributing to rising healthcare costs,2 it was pivotal to investigate and implement strategies to reduce the mean LOS for post-stroke rehabilitation patients in AH.

Objective: To reduce the average LOS of post-stroke patients admitted to AH rehabilitation ward to less than 30 days from Jan to June 2022.

Methodology: Root cause analysis identified 31 root causes, which were further categorized into 5 themes. These include processes, CGT duration, equipment prescription/home modifications, discharge issues and complex cases. A Pareto chart was used to identify the main causes of increased LOS. Reasons of prolonged LOS with the highest frequency were CGT, awaiting arrival of new caregiver, discharge issues (including patient/family's acceptance of their medical condition), awaiting institutional placement, equipment prescription/home modifications, and repatriation. Focused group discussions were done to devise targeted interventions.

Interventions: Targeted interventions were implemented to address the main causes of the prolonged LOS. These include a standard workflow on financial means testing for
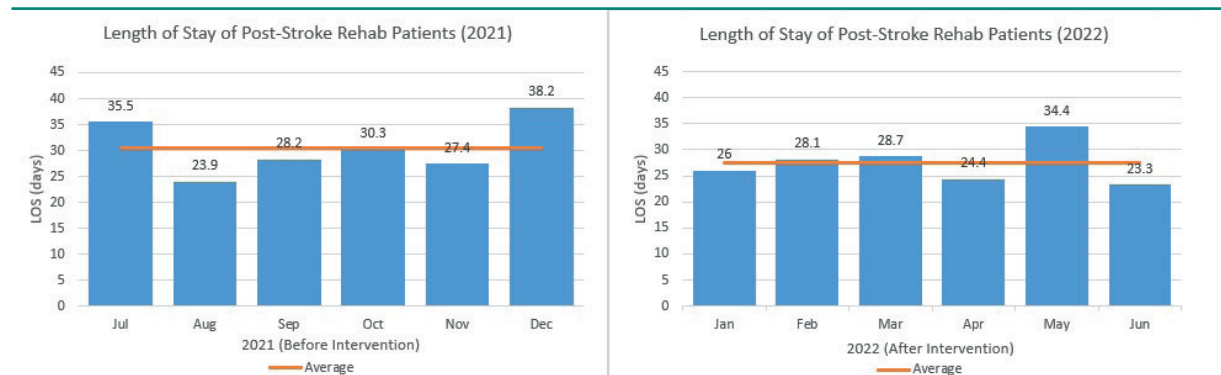
P164 Fig. 1
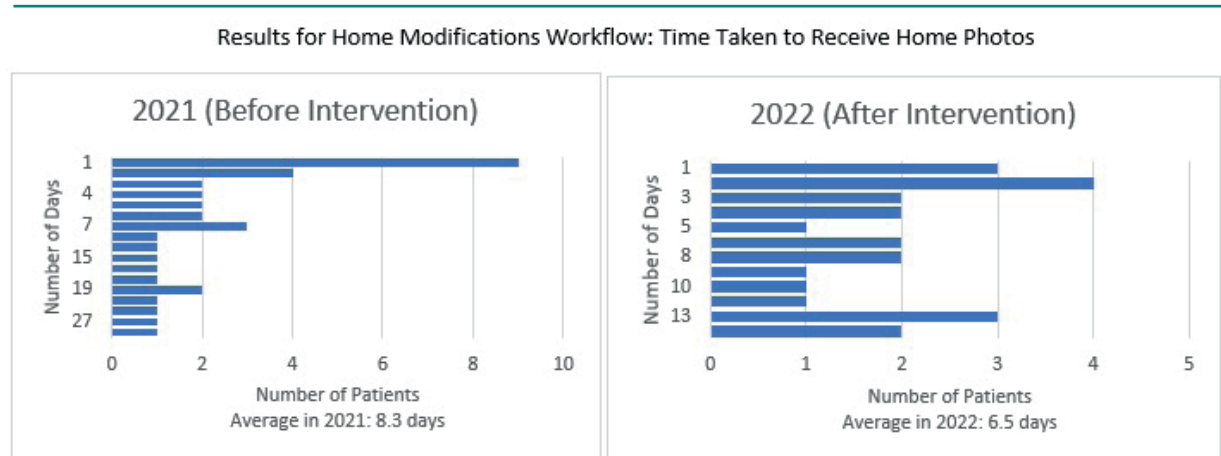
P164 Fig. 2

equipment subsidy and home modification to alleviate the issues on delays related to these processes, adjusting the psychologist referral criteria to allow early identification and referrals for patients and family members, and visual aids, such as checklists, were put up to ensure adherence to standard workflow.

Results: After applying the interventions, there was a reduction in LOS for 5 out of the 6-month intervention period from January to June 2022. The average LOS was 27.4 days from January to June 2022 compared to 30.5 days from July to December 2021. (Fig. 1) With the improved home modification workflow, time taken to receive home photos reduced from 8.3 days to 6.5 days. (Fig. 2)

Conclusion: The interventions were effective in reducing LOS to below 30 days. Fig. 1, Fig. 2

References:

1 Ng YS, et al. Predictors of Acute, Rehabilitation & Total Length of Stay in Acute Stroke: A Prospective Cohort Study. Ann Acad Med Singapore 2016; 45:394
2 Saxena SK, et al. Total direct cost, LOHS, institutional discharges and their determinants from rehabilitation settings in stroke patients. Acta Neurol Scand 2006: 114: 307

P165

Exploring the potential of transcranial direct current stimulation for relieving central post-stroke pain: a randomized controlled pilot study

J. Baik (Yangsan/KR), S. H. Ko (Yangsan/KR), J. Lee (Yangsan/KR), H. J. Yeo (Yangsan/KR), S. G. Ham (Yangsan/KR), Y. I. Shin (Yangsan/KR)

Introduction: Pain can be caused by various factors, and continuous pain can negatively affect a patient's quality of life. Neuropathic pain caused by stroke, spinal cord injury, or multiple sclerosis is difficult to cure with painkillers. Central post-stroke pain (CPSP) is a type of neuropathic pain caused by a lesion or dysfunction of the central nervous system, and it is difficult to identify the pain mechanism that causes it. Non-invasive brain stimulation techniques, such as tDCS, have been studied as a treatment for CPSP. The tDCS could potentially stimulate the relevant areas of the brain to target pain mechanisms. The **Objective** of this study is to investigate whether tDCS has a significant effect on pain reduction in CPSP patients compared to a sham group, and to analyze the potential impact of lesion location on tDCS effectiveness in CPSP patients.
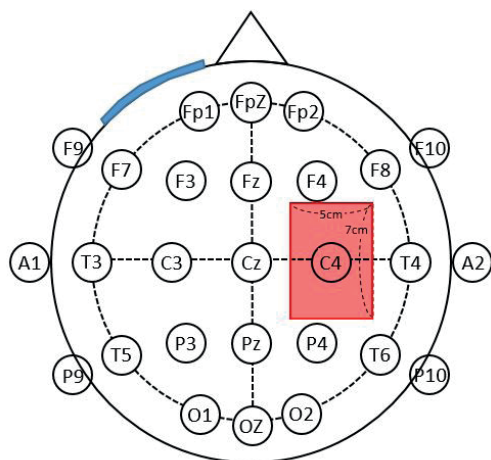
P165 Fig. 1
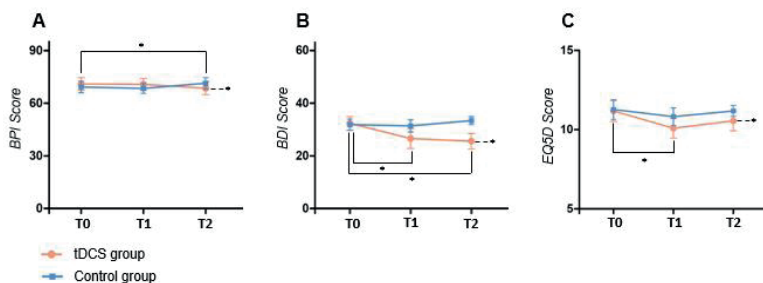
P165 Fig. 2

Method: In this study, we used the DC-STIMULATOR PLUS [NeuroConn GmbH (Germany)] tDCS intervention method, which is based on the 10-20 System targeting the primary motor cortex (M1; C3, C4- Anode, over the contralateral supraorbital region-cathode) (Figure 1). The intervention lasted for 20 minutes (2mA), 5 times a week for 2 weeks. The sham device was the same as the tDCS group's test device, but the electrical stimulus was blocked. The control group received a post-evaluation (T1) two weeks after the baseline (T0), and the follow-up evaluation (T2) was conducted one week after the intervention was completed. The study measured changes in pain (BPI), depression (BDI), and quality of life (EQ5D) scores.

Result: The study involved 22 participants with CPSP, all of whom completed the intervention, and no one dropped out. The participants were divided into two groups: tDCS (11 participants) and sham (11 participants). There was no significant difference in age or onset period between the two groups. The tDCS group showed a significant change in BPI, BDI, and EQ5D scores, while the sham group did not. But there was no significant difference in BPI, BDI and EQ5D score change between the tDCS group and the sham group (Figure 2).

Conclusion: This study examined the effect of tDCS on pain, depression, and quality of life in CPSP patients, but found no significant improvement compared to the sham group. However, the tDCS group analysis showed significant changes, and the effect on pain varied depending on the lesion. This suggests that the impact of M1 tDCS intervention in patients with CPSP may not be definitive. These findings provide a framework for understanding the effects of tDCS in patients with CPSP.

P166

The effect of cerebrolysin therapy combined with ringoal ai augmented muscle strengthening training on the recovery of affected upper limb function in subacute stroke patients

H. Y. Chen (Tainan/TW), J. C. Huang (Tainan/TW)

Background: Cerebrolysin therapy had been proved to facilitate recovery of affected upper limb function in acute stroke patients1. The purpose of this trial is to investigate the effect of Cerebrolysin therapy combined with AI augmented muscle strengthening training on the recovery of affected upper limb function in subacute stroke patients.

Objectives: From 2021 Jan. to 2023 Jan., a total of 89 stroke patients with onset duration less than on months were

hospitalized at Jen-Chun rehabilitation center for 6 weeks. Among them, 70 acquiring active motion of affected upper limb (better than Brunnstrom III) were enrolled in this trial. There were 29 females and 41 males, the average age was 63.9±9.5 y/o. They were divided into group A (Cerebrolysin + AI strengthening, N = 24), group B (Cerebrolysin only, N = 20), and group C (AI strengthening only, N = 26). Every patient underwent standard rehabilitation program for stroke.

Method: Action research arm test (ARAT) and muscle power test were performed at admission and discharge respectively. The dosage of Cerebrolysin was 10 ml per day for 14 days. AI augmented muscle strengthening exercise was delivered by Ringoal system for 4 weeks to train the muscle power of shoulder girdle, deltoid, triceps and biceps. Chi-squared test was used to analyze the result of ARAT.

Results: 1. Motor control improvement of affected upper limb, group A (21/24, 87.5%), group B (17/20, 85.0%), group C (15/26, 57.7%). 2. Muscle power improvement of affected upper limb, group A (22/24, 91.7%), group B (11/20, 55.0%), group C (18/26, 69.2%). 3. ARAT at admission, group A 26.4±4.5 points, group B 29.2±5.7 points, group C 28.0±5.2 points. There was no significant difference between groups. 4. ARAT at discharge, group A 43.3±6.5 points, group B 38.0±5.2 points, group C 35.6±4.1 points. There were significant differences between group A and B (P<0.05), and group A and C (P<0.05).

Conclusion: AI augmented muscle strengthening system is designed for individual user to prevent strain or sprain injury during exercise. In this trial, Cerebrolysin therapy combined with Ringoal AI system strengthening training resulted in significant recovery of affected upper limb function than Cerebrolysin only or strengthening exercise only. Muscle power training is an important factor to improve limb and hand function in subacute stroke patients.

References:
1. Dafin F Muresanu, Wolf-Dieter Heiss, Volker Hoemberg, Ovidiu Bajenaru, Cristian Dinu Popescu, Johannes C Vester, Volker W Rahlfs, Edith Doppler, Dieter Meier, Herbert Moessler, Alla Guekht. Cerebrolysin and Recovery After Stroke (CARS): A Randomized, Placebo-Controlled, Double-Blind, Multicenter Trial. Stroke 2016 Jan;47(1):151-9.

P167

Effects of SensibleTAB robot – assisted therapy on upper limb function in subacute stroke

W. Kitisomprayoonkul (Bangkok/TH), J. Panyakampol (Bangkok/TH), P. Terachinda (Bangkok/TH), P. Wongphaet (Bangkok/TH)

Background: Robotic rehabilitation therapy and Perfetti's method improved upper limb function in stroke. However, the effect of robot training based on the Perfetti's method has not been studied.

Objective: To evaluate the effect of the SensibleTAB, an end–effector robot training with Perfetti's method, on upper limb function in subacute stroke patients.

Method: A single–blinded randomized controlled trial was conducted. Subacute stroke patients who participated in outpatient rehabilitation medicine service received one of two rehabilitation protocol. One group (n=18) received robotic rehabilitation therapy (RT) with the SensibleTAB robot for 30 minutes and then occupational therapy for 15 minutes. The other group (n=17) received only occupational therapy (OT) for 45 minutes. Both groups received 18 ses-

P167 Fig. 1

sions (3 days/week, 6 weeks). Assessments were performed at baseline and 6 weeks. The outcomes were Fugl–Meyer Assessment of Upper Extremity (FMA–UE) motor score, Action Research Arm Test (ARAT), Box and Block Test (BBT) and Barthel Index (BI).

Results: The FMA–UE motor score, ARAT, BBT and BI of the RT group increased 4.67, 7.06, 6.83 and 3.83 points (P<0.01). The FMA-UE motor score, ARAT, BBT and BI of the OT group increase 4.88, 7.41, 4.71 and 1.76 points (P<0.05). Patients receiving the robotic rehabilitation therapy combined with brief occupational therapy did not differ from patients who received only occupational therapy in all outcomes (P>0.05).

Conclusion: The results showed an improvement of the upper limb function of subacute stroke with the SensibleTAB robot–assisted therapy combined with occupational therapy. The effects are not different from dose–matched occupational therapy.

P168

Secondary prevention as inevitable part of stroke rehabilitation

A. Lukmann (Tartu/EE), C. Maran (Tartu/EE), J. Intšite (Tartu/EE)

Objective: Optimizing stroke prevention is a major public health priority. Stroke remains a leading cause of adult neurological physical and cognitive disability, dementia, and death, globally. Unfortunately, the main principles of secondary prevention are not included in all guidelines on stroke rehabilitation.

Stroke patients with atrial fibrillation (AF) have a greater risk of primary and secondary cardioembolic stroke. In addition to other prevention factors, antithrombotic and statin treatment have one of the most important roles in secondary stroke prevention. Statin therapy is recommended for all atherosclerotic stroke patients, even if the blood lipid profile is within reference ranges.

The purpose of this research was to evaluate the principles of secondary prevention in stroke patients within the last decade (2010 versus 2020).

Methods: We analysed the data of acute stroke patients referred to the inpatient rehabilitation department of Tartu University Hospital. The study involved 328 retrospective medical cases (142 cases in 2010, 186 cases in 2020) while antithrombotic and statin treatment was analysed.

Results: In 2010, 38**%** (n=54) of stroke patients in the inpatient rehabilitation department had AF. In 2020, 43**%** (n=81) of stroke patients had AF. In 2010, 74**%** (n=40) and in 2020, 95**%** (n=77) of stroke patients with AF had anticoagulant therapy. The study shows that the usage of anticoagulant therapy in the inpatient rehabilitation department has improved during the last decade (74**%** vs 95**%**).

In 2010, only 51**%** (n=72) of stroke patients received statin therapy, but in 2020, already 87**%** (n=161) received statin therapy. Similarly to anticoagulant therapy, the usage of statin therapy has improved remarkably (51**%** vs 87**%**).

Conclusion: Over the last ten years, there has been a notable enhancement in the secondary prevention of stroke patients at Tartu University Hospital's Sports Medicine and Rehabilitation Clinic's inpatient rehabilitation department. Along with other secondary prevention techniques, anticoagulant and statin therapy have become increasingly significant. The authors stress the crucial importance of physical and rehabilitation medicine (PRM) physicians being knowledgeable about the principles of secondary prevention and implementing them in their routine clinical practice.

P169

Mapping the care pathway in post-stroke spasticity: insights from England

R. Prasad (Leicester/GB), G. Bavikatte (Liverpool/GB), E. Bradaschia (London/GB), M. Mariappan (Wolverhampton/ GB), P. Maisonobe (Boulogne-Billancourt/FR), S. Page (Slough/GB), V. Degtiar (Slough/GB), M. Ippolito (Slough/ GB), C. Bezzina (Stoke-on-Trent/GB)

Introduction: Post-stroke spasticity (PSS) is a common complication of stroke that may develop after a patient is discharged from acute care. Although there is a well-defined patient management pathway for stroke in England, with a multidisciplinary team (MDT) to manage the vascular components, PSS management is not well integrated into that pathway.

Objectives: To estimate national PSS prevalence and incidence and to map the current patient care pathway for PSS in England.

Materials and Methods: National PSS prevalence and incidence in the fiscal years 2016 – 2021 was estimated from Hospital Episode Statistics (HES) data using ICD-10 codes that are correlated with spasticity- and stroke-related diagnoses.
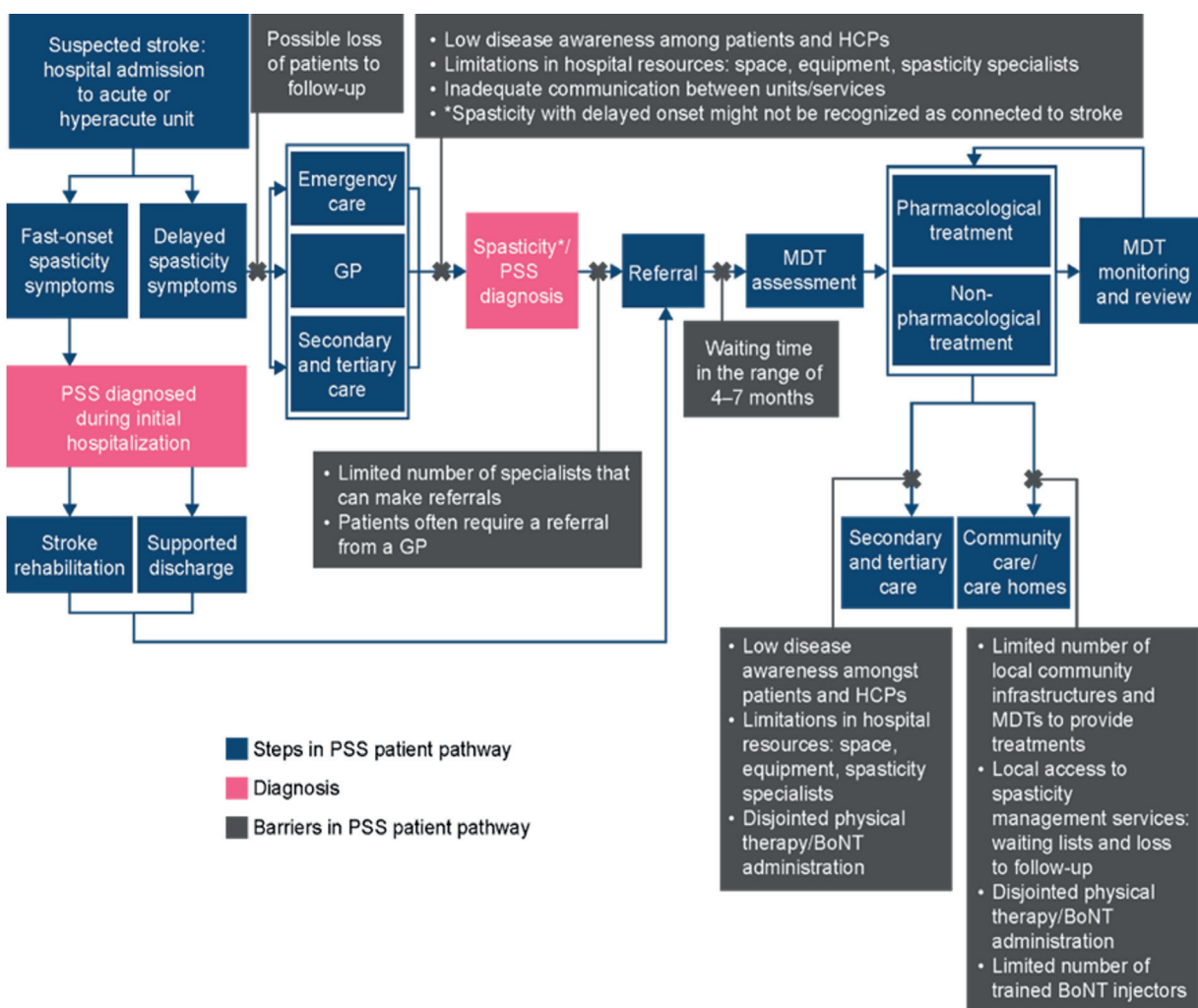
P168 Fig. 1: Map of patient care pathway for PSS in England.
BoNT: botulinum toxin; GP: general practitioner; HCP: healthcare professional; MDT: multidisciplinary team; PSS: post-stroke spasticity

To contextualize these data and identify local variations in the PSS care pathway, Freedom of Information requests (FOI) were sent to 150 English trusts and in-depth, semi-structured interviews with NHS clinical experts managing PSS were held. Local insights on PSS care pathways were gathered from NHS England trust websites that specified available spasticity services. To accurately interpret the complexity of the PSS care pathway we sought NHS expert appraisal and consensus at an advisory board.

Results: Using the HES database, we analyzed data from 103 145 patients who had been admitted to hospitals in England between April 2016 and March 2021 (inclusive) and whose records were linked to ICD-10 codes with a correlation to stroke-related illness and spasticity. Prevalence of PSS ranged from 20 to 64 **%**: 65 785 patients (64 **%**) had received a PSS-related diagnosis during their initial hospitalization and 21 000 (20 **%**) during a subsequent admission.

Based on data from HES, FOI responses (n=126/150), and clinical expertise, the NHS experts provided their insights into the care pathway in PSS. The experts agreed that optimal management requires an early diagnosis of PSS in patients discharged after stroke, a seamless primary – secondary

service junction, and a comprehensive MDT approach. However, this is not reflected in the national PSS care landscape. In the absence of early diagnosis of PSS and timely access to specialist MDT clinics for PSS, patients have to schedule multiple visits across specialties, often requiring separate referrals. Lastly, there is no established pathway for regular monitoring of patients who have experienced a stroke in the community, so patients are often lost to follow-up. (Figure). The lack of appropriate ICD coding for PSS presents an additional challenge because it contributes to inaccurate epidemiological data. This leads to a skewed perception of PSS prevalence and prevents accurate service planning and budgeting.

Conclusion: Our analyses and pathway mapping indicate that there is a disjointed care pathway for patients with PSS across NHS England trusts, with a potential notable loss of patient follow-up after hospital discharge.

P170

Post-stroke care pathway in England: barriers and plausible solutions

R. Prasad (Leicester/GB), G. Bavikatte (Liverpool/GB), E. Bradaschia (London/GB), M. Mariappan (Wolverhampton/GB), P. Maisonobe (Boulogne-Billancourt/FR), S. Page (Slough/GB), V. Degtiar (Slough/GB), M. Ippolito (Slough/GB), C. Bezzina (Stoke-on-Trent/GB)
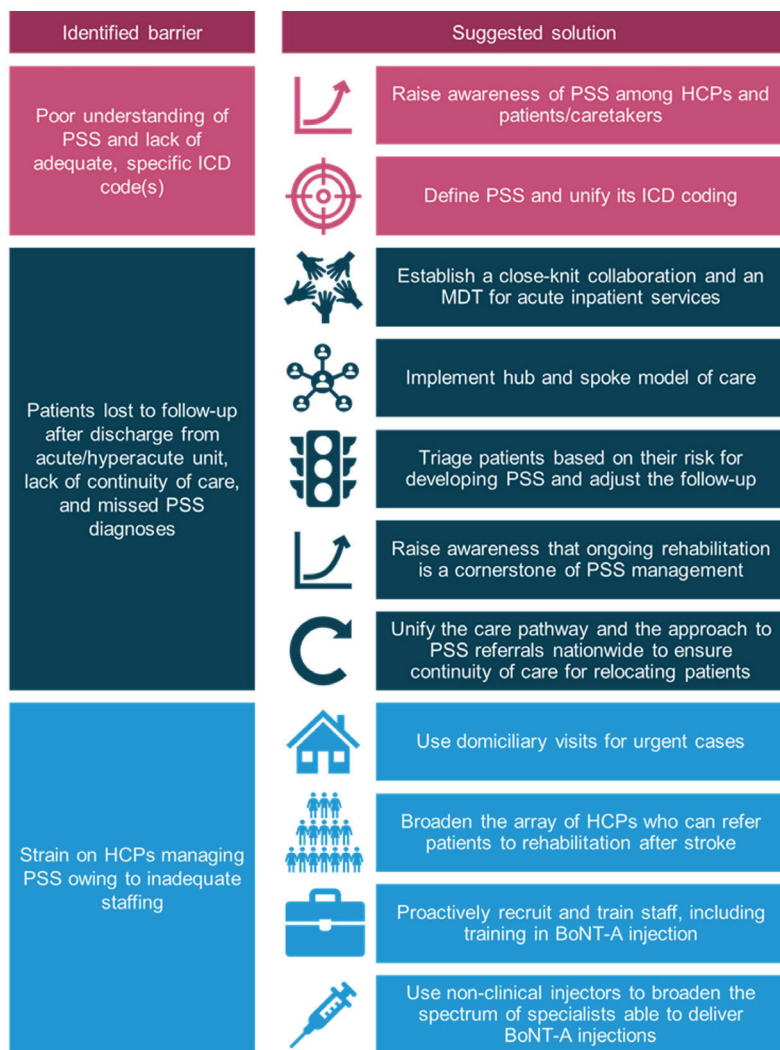
Introduction: Post-stroke spasticity (PSS) often develops after patients are discharged from acute care and initial symptoms can be mild and/or mimic other movement disorders. Therefore, detection and management of PSS requires a comprehensive multidisciplinary approach and a streamlined care pathway.

Objectives: To identify the challenges faced by patients with PSS and the clinicians treating them and to put forward plausible solutions based on best clinical practice.

Materials and Methods: To estimate national PSS prevalence and incidence in fiscal years 2016 – 2021, we extracted Hospital Episode Statistics (HES) data using ICD-10 codes that are correlated with stroke-related illness and spasticity. To contextualize these data we sent Freedom of Information requests (FOI) to 150 English NHS trusts and held in-depth, semi-structured interviews with NHS clinical experts managing PSS during the COVID-19 pandemic. Subsequently, an advisory board was held to interpret and appraise the findings from HES database and FOI requests. Finally, the experts formed a steering committee to share best practices, agree on recommendations, and to suggest plausible solutions to streamline and optimize the PSS care pathway in England.

Results: In total, we analyzed HES data for 103 145 patients, which were supplemented with responses to the FOI requests received from 126 of the 150 contacted NHS trusts. These data showed that PSS management differs depending on location and there is a lack of nationally implemented care pathway for PSS.

The barriers and expert-recommended solutions identified during the steering committee are summarized in the Figure. The main barriers to effective PSS management include:1) low disease awareness of PSS among healthcare professionals and patients/caretakers; 2) lack of a nationally implemented, integrated care pathway for PSS that would monitor all patients following a stroke, even those who initially

Identified barrier	Suggested solution
Poor understanding of PSS and lack of adequate, specific ICD code(s)	Raise awareness of PSS among HCPs and patients/caretakers
	Define PSS and unify its ICD coding
Patients lost to follow-up after discharge from acute/hyperacute unit, lack of continuity of care, and missed PSS diagnoses	Establish a close-knit collaboration and an MDT for acute inpatient services
	Implement hub and spoke model of care
	Triage patients based on their risk for developing PSS and adjust the follow-up
	Raise awareness that ongoing rehabilitation is a cornerstone of PSS management
	Unify the care pathway and the approach to PSS referrals nationwide to ensure continuity of care for relocating patients
Strain on HCPs managing PSS owing to inadequate staffing	Use domiciliary visits for urgent cases
	Broaden the array of HCPs who can refer patients to rehabilitation after stroke
	Proactively recruit and train staff, including training in BoNT-A injection
	Use non-clinical injectors to broaden the spectrum of specialists able to deliver BoNT-A injections

P170 Fig. 1. Summary of expert recommendations
BoNT-A botulinumtoxinA; GP, general practitioner; HCP, healthcare professional; ICD, International Statistical Classification of Diseases and Related Health Problem; PSS, post-stroke spasticity.

present with a low risk of developing PSS; and 3) workforce challenges, especially across rehabilitation specialists and physicians who manage botulinumtoxinA (BoNT-A) injections, which should be considered a first-line treatment for disabling focal and multifocal spasticity.

Experts have based their recommendations on their own clinical experience, including the challenges faced and exacerbated by the COVID-19 pandemic. These include unifying care pathway nationwide, establishing specialist multidisciplinary teams, triaging patients after stroke, broadening the range of HCPs who can refer to spasticity services, and addressing staff shortages with BoNT-A injector training.

Conclusions: Although there are numerous barriers to optimal PSS management, several plausible solutions to help overcome these barriers have been identified based on practices of English NHS trusts.

P171

Retrospective pre-post stroke awareness about physiotherapy and stroke among stroke survivors

S. Ganvir (Ahmednagar/IN), M. Harishchandre (Ahmednagar/IN)

Background: Awareness about Physiotherapy plays a major role in early contact of patients with Physiotherapists in rural population in general and stroke survivors in particular. However, it is interesting to investigate if these stroke survivors become aware about Stroke signs and role of Physiotherapy after the episode of stroke.

Objective: To explore the status of stroke survivors with respect to stroke signs and role pf Physiotherapy, pre and post Stroke episode.

Method: 189 patients treated in last 3 years (2020–2022) in Physiotherapy unit of a tertiary care hospital were interviewed with structured questionnaire about their perception of role of Physiotherapy and knowledge about signs of Stroke. They were asked to rate their perception on 10 questions before and after the episode of stroke. For every yes answer in the questionnaire 10 point was given and for every no answer 0 point was given. Total score was used to compare the pre and post stroke awareness. Each question was further supplemented with qualitative explanation.

Results: There was a change of maximum 10 points in knowledge about stroke signs and awareness about role of Physiotherapy which indicates non significant increase in knowledge and awareness. Qualitative analysis revealed that patients are willing to spread the awareness but were never approached for the same. Inspite of functional improvement, longer time required for overall rehabilitation to regain functional ability, makes rehabilitation a last priority among stroke survivors as well as care givers.

Conclusion: In view of minimal change in perception of patients about Stroke, more remedial measures in form of structured awareness module can be prepared and Stroke survivors be trained in its application to guide population in general about basics of Stroke.

References

1. R. Wiles, Ann Ashburn, S. Payne & C. Murphy (2002) Patients' expectations of recovery following stroke: a qualitative study, Disability and Rehabilitation, 24:16, 841-850.
2. Menon B, Swaroop JJ, Deepika HK, Conjeevaram J, Munisusmitha K. Poor awareness of stroke—a hospital-based study from South India: an urgent need for awareness programs. Journal of Stroke and Cerebrovascular Diseases. 2014 Sep 1;23(8):2091-8.

P172

Effects of reverse gait training in stroke rehabilitation

M. P. Kumar (Madurai/IN)

Stroke rehabilitation is one of the oldest **Methods** of rehabilitation in which the prime role of mobility is laid in the hands of physiotherapy.It is the second leading cause of death and the most common cause of disability in adults which has its effect on quality of life of the patients and his dependents.A recent study says, 26**%** of individuals with stroke have a disability in activities of daily living (ADL), and 50**%** have reduced mobility due to hemiparesis.Inspite of number of treatment approaches the knee control in stroke patients remains least addressed area.The knee control will directly have its impact on the static control and dynamic control.So the knee control plays key role in bringing back the mobility of the stroke patients.Reverse gait training in one of the main adjunct that can be used along with the other concepts of treatments and seems to be much effective.In this study we took five of our patients with hemiplegia(both right and left sides)and included reverse gait training as part of their rehabilitation program together with conventional physiotherapy treatment as a pilot study.We came out with good outcomes in terms of gait and static balance.There is a need in future to work in this reverse gait training method which could be one of the simple and effective tool for gait training.

P173

Relationship between stroke-related sarcopenia and physical activity in chronic stroke

M. A. Ruescas-Nicolau (Valencia/ES), M. L. Sánchez-Sánchez (Valencia/ES), J. J. Carrasco (Valencia/ES), S. Cortes-Amador (Valencia/ES), S. Pérez-Alenda (Valencia/ES), A. Montalva-Iborra (Valencia/ES), A. Arnal-Gómez (Valencia/ES)

Introduction: Stroke-related sarcopenia has been found in 53.5**%** of stroke survivors [1]. Physical inactivity after stroke can partially contribute in its development [2]. However, physical activity (PA) habits in subjects with stroke-related sarcopenia have not been evaluated previously.

Objectives: This study aimed to explore the relationship between stroke-related sarcopenia and PA in people with chronic stroke.

Methods: In this cross-sectional study, subjects affected with stroke sequelae (≥6 months), able to walk indoors without a walking aid or supervision and without cognitive impairment, were included. The SARC-F questionnaire [3] and Actigraph GT3x accelerometers were used to assess sarcopenia and PA, respectively. Bivariate correlations were used to study the relationship between the SARC-F score and the time spent in lifestyle, light, moderate, vigorous and moderate-to-vigorous PA. Also, PA differences between participants with sarcopenia (SARC-F score ≥4) versus those without were analyzed with Student's t-tests.

Results: Thirty participants (58.6±8.7 years, 63.3**%** male), of whom 11 showed sarcopenia, participated. As shown in table 1, inverse correlations were found between the SARC-F score and the time spent in lifestyle (r=-0.370, p=.044), moderate (r=-0.388, p=.034) and moderate-to-vigorous PA (r=-0.368, p=.045) **(Table 1)**. The time spent in lifestyle and vigorous PA resulted significantly lower in subjects with sarcopenia vs those without (28.65±26.69 vs 47.42±18.03

P173 Table 1

Table 1. Relationship between the SARC-F score and the time spent in physical activities of different intensity

	Lifestyle	Light PA	Moderate PA	Vigorous PA	Moderate-to-vigorous PA
Correlation coefficient	-.370	-.223	-.388	-.132	-.368
Sig. (bilateral)	**.044**	.235	**.034**	.489	**.045**

PA: Physical Activity. Significant results are highlighted in bold.

min/day, p=.029 and 0.99±0.59 vs 1.93±1.50 min/day, p=.023 respectively, see **Table 2**).

P173 Table 2

Table 2. Between-group differences in time spent in physical activity

	Non stroke-related sarcopenia (n=19)	Stroke-related sarcopenia (n=11)	Between-group differences		
			t$_{(28)}$	p value	ES
Lifestyle	47.42 (18.04)	28.65 (26.69)	2.300	**.029**	.398
Light PA	41.42 (12.01)	38.71 (24.74)	0.407	.687	.076
Moderate PA	26.73 (25.04)	13.51 (12.78)	1.624	.116	.293
Vigorous PA	1.93 (1.50)	0.99 (0.59)	2.419	**.023**	.415
Moderate-to-vigorous PA	29.18 (26.04)	14.85 (13.01)	1.697	.101	.305

PA: Physical Activity
Data are shown as mean (standard deviation). Significant results are highlighted in bold.
ES: r effect size statistics (r=.10, small effect; r=.30 medium effect; r≥ .50, large effect).

Conclusions: Our results showed that, in people with chronic stroke, sarcopenia was related to lower PA levels. Mainly, subjects with stroke-related sarcopenia were less active in lifestyle activities. These results must be interpreted with caution due to the small sample size.

This study was supported by a grant from Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital (CIGE/2021/099).

References:
1 Shiraishi, A., Yoshimura, Y., Wakabayashi, H., & Tsuji, Y. (2018). Prevalence of stroke-related sarcopenia and its association with poor oral status in post-acute stroke patients: Implications for oral sarcopenia. Clinical Nutrition, 37(1), 204-207.
2 Ryan AS, Buscemi A, Forrester L et al (2011) Atrophy and intramuscular fat in specific muscles of the thigh: associated weakness and hyperinsulinemia in stroke survivors. Neurorehabil Neural Repair 25:865 – 872.
3 Malmstrom TK, Morley JE. SARC-F: a simple questionnaire to rapidly diagnose sarcopenia. J Am Med Dir Assoc 2013;14:531 – 2.

P174

Prevalence of frailty status in community dwelling chronic stroke survivors and differences between women and men

M. L. Sánchez-Sánchez (Valencia/ES), M. A. Ruescas-Nicolau (Valencia/ES), A. Arnal-Gómez (Valencia/ES), J. J. Carrasco (Valencia/ES), S. Pérez-Alenda (Valencia/ES), J. Engo-Vidal (Benicarló/ES), C. Fleque-Miravet (Benicarló/ES), J. Segura-Navarro (Benicarló/ES), S. Cortes-Amador (Valencia/ES)

Background: Chronic diseases are considered to be major determinants of frailty (1). However, the prevalence of frailty and methods for frailty assessment are understudied in the stroke population, especially in chronic stroke (2).
Objectives: This study aimed to explore the prevalence of frailty status in community dwelling chronic stroke survivors with two different assessment tools, taking into account differences between women and men.
Methods: In this cross-sectional study, post-stroke subjects in the chronic phase, able to walk indoors without a walking aid and without cognitive impairment, were recruited.

The Fried phenotype and the Frail Scale were used to assess frailty status. Due to the small sample size, to compare demographic and clinical variables between men and women, the U de Mann-Whitney test was used. Moreover, to compare the proportion of men and women in the different frailty status, the Chi-square statistic was used.
Results: Twenty-eight subjects (57.3 ± 8.6 years, 42.9 % women) participated. No significant differences were found between men and women in age, body mass index and Stroke Impact Scale **(Table 1)**. According to the Fried phenotype (Table 2), the proportion of pre-frail and frail subjects resulted significantly higher (χ2(2) = 8.944, p = .004) in women than in men (58,3 % vs 87.5 % and 41,7 % vs 0 %, respectively). The Frail Scale classified more participants as robust (women 8.3**%**, men 37.5 %) and did not show differences by sex in the frailty status **(Table 2)**.
Conclusions: Despite having similar physical function (measured by Stroke Impact Scale), women seem to be more predisposed to states of frailty than men in community dwelling chronic stroke survivors. The Fried phenotype seems to detect frailty status better than the Frail Scale in people post-stroke. Future research is warranted.

This study was supported by a grant from Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital (CIGE/2021/099).

References:
1 Onder G, Vetrano DL, Marengoni A, Bell JS, Johnell K, Palmer K; Optimising Pharmacotherapy through Pharmacoepidemiology Network (OPPEN). Accounting for frailty when treating chronic diseases. Eur J Intern Med. 2018 Oct;56:49-52. doi: 10.1016/j.ejim.2018.02.021.
2 Taylor-Rowan M, Cuthbertson G, Keir R, et al. The prevalence of frailty among acute stroke patients, and evaluation of method of assessment. Clin Rehabil. 2019;33(10):1688-1696. doi:10.1177/0269215519841417

P174 **Table 1.** Descriptive results of the participants

Variables	Women (n=12)	Men (n=16)	P value
Age (years)	56.5 [45.0-62.5]	60.0 [52.0-65.5]	.177
BMI (kg/m²)	29.1 [24.7-35.6]	29.8 [26.8-31.1]	.926
SIS-16 (scoring)	68.5 [58.0-77.3]	68.5 [63.3-74.5]	.744
TUG (s)	18.6 [12.2-30.5]	11.6 [10.4-19.3]	.078

BMI: Body Mass Index; Stroke Impact Scale: SIS-16; TUG: Timed Up and Go Test. Data shown as median [interquartile range (25th-75th percentile)]. Between-group comparisons were analyzed by using Mann Whitney U test

P174 **Table 2.** Results of prevalence of frailty status in community dwelling chronic stroke survivors with two different assessment tools

Assessment tool	Frailty status	Women (n=12)	Men (n=16)	P value
Fried phenotype	**Robust**	0 (0.0)	2 (12.5)	
	Pre-frail	7 (58.3)	14 (87.5)	**.004**
	Frail	5 (41.7)	0 (0.0)	
Frail Scale	**Robust**	1 (8.3)	6 (37.5)	
	Pre-frail	9 (75.0)	10 (62.5)	.069
	Frail	2 (16.7)	0 (0.0)	

Data shown as frequency (percentage). The proportion of women and men in the different frailty status was analyzed using the Chi-square statistic.

P175

Cross-sectional study of bone mineral density in chronic stroke survivors with limited versus non-limited community ambulation

M. L. Sánchez-Sánchez (Valencia/ES), J. J. Carrasco (Valencia/ES), S. Pérez-Alenda (Valencia/ES), S. Cortes-Amador (Valencia/ES), A. Arnal-Gómez (Valencia/ES), A. Miralles-Albalat (Castellón/ES), D. Safont-Arnau (Castellón/ES), M. A. Ruescas-Nicolau (Valencia/ES)

Background and aims: The decreased bone mineral density (BMD) on the paretic side and the incidence of falls increase fracture risk in stroke survivors (1). However, in chronic stroke survivors, the impact of their functional capacity on BMD is understudied (2). Therefore, this study aimed to explore the association between BMD of lower limbs and walking speed in subjects with chronic stroke.

Methods: In this cross-sectional study, 32 participants with chronic hemiparesis poststroke (divided in a slow gait group (SG<0.8 m/s, n=15) and a fast gait group with full community ambulation speed (FG≥0.8m/s) were recruited (Table 1). The 10 meter walk test (10MWT) was used to assess comfortable walking speed. Moreover, t-score and z-score were measured by ultrasound bone densitometry (Sonost3000). Bivariate correlations were used to study the association between t-score and z-score of the lowers limbs and 10MWT. To determine the differences between limbs and among groups in BMD, two-factor ANOVAs [group(2) x limb(2)] with repeated measures in factor limb were used.

Results: As shown in Table 1, positive correlations were found between 10MWT and t-score (r=0.414, p=.021) and z-score (r=0.368, p=.041) of the paretic limb. Also in t-score of the non-paretic limb (r=0.357, p=.045). The SG (59.27±8.37 years, 46.7% male) presented significantly lower t-score (p=.024) and z-score (p=.032) in the paretic vs the non-paretic limb while the FG (57.18±8.94 years, 82.4% male) did not show differences between limbs (Table 2).

Conclusions: Our results showed that, in people with chronic stroke, lower walking speed was associated to lower BMD. Although future research is needed, it seems stroke survivors with limited community ambulation should be controlled for fracture risk. Fig. 1, Fig. 2

References:
1. Schnitzer TJ, Harvey RL, Nack SH, Supanwanid P, Maskala-Streff L, Roth E. Bone mineral density in patients with stroke: relationship with motor impairment and functional mobility. Top Stroke Rehabil. 2012 Sep-Oct;19(5):436-43. doi: 10.1310/tsr1905-436.
2. Yang FZ, Jehu DAM, Ouyang H, Lam FMH, Pang MYC. The impact of stroke on bone properties and muscle-bone relationship: a systematic review and meta-analysis. Osteoporos Int. 2020;31(2):211-224. doi:10.1007/s00198-019-05175-4

P175 Table 1. Results of bivariate correlations

		T-score_Paretic limb	Z-score_Paretic limb	T-score_Non-paretic limb	Z-score_Non-paretic limb	10MWT
T-score_Paretic limb	Pearson's r	1	.981**	.722**	.659**	.414*
	P		<0.001	<0.001	<0.001	0.021
	N	32	32	32	32	31
Z-score_Paretic limb	Pearson's r	.981**	1	.712**	.697**	.368*
	P	<0.001		<0.001	<0.001	0.041
	N	32	32	32	32	31
T-score_Non-paretic limb	Pearson's r	.722**	.712**	1	.967**	.357*
	P	<0.001	<0.001		<0.001	0.045
	N	32	32	33	33	32
Z-score_Non-paretic limb	Pearson's r	.659**	.697**	.967**	1	0.282
	P	<0.001	<0.001	<0.001		0.118
	N	32	32	33	33	32
10MWT	Pearson's r	.414*	.368*	.357*	0.282	1
	P	0.021	0.041	0.045	0.118	
	N	31	31	32	32	32

10 MWT: 10 meter walk test. ** The correlation is significant at the .01 level (bilateral). * The correlation is significant at the .05 level (bilateral).

P175 Table 2. Results of bone mineral density between limbs and among groups

		SG (< 0.8m/s) (n=15)	FG (> 0.8m/s) (n=17)	Between-group analysis (P [95% CI])
T-score	Paretic limb	-1.44 (1.00)	-0.49 (1.30)	**0.032** [-1.83:-0.09]
	Non-paretic limb	-0.91 (0.89)	-0.35 (0.97)	0.11 [-1.25:0.13]
	Within-group analysis (P [95% CI])	**0.024** [-1.00:-0.07]	0.51 [-0.55:0.28]	
Z-score	Paretic limb	-0.87 (1.07)	0.04 (1.48)	0.07 [-1.87:0.07]
	Non-paretic limb	-0.29 (0.98)	0.20 (1.15)	0.22 [-1.28:0.31]
	Within-group analysis (P [95% CI])	**0.032** [-1.10:-0.05]	0.50 [-0.63:0.32]	

Data are expressed as mean (standard deviation). Significant differences are highlighted in bold.
SG: Slow speed Group; FG: fast speed Group.

P176

Kinematic gait variability and its clinical correlates in chronic stroke

M. Tschopp (Sion/CH), *P. Nicolo (Geneva/CH)*, *S. Bailleul (Grenoble/FR), S. Armand (Geneva/CH), J. Masset (Lausanne/CH)*

Introduction: Gait variability is inherent to the sensorimotor system and influenced by factors such as age and pathology. Following a stroke, spatio-temporal gait variability is associated with gait impairment. Studies investigating kinematic gait variability and its clinical correlates are lacking.

Objectives: 1) To determine the kinematic variability of the lower limbs of post-stroke patients compared to control participants, 2) To compare the kinematic variability of the paretic lower limb to the non-paretic lower limb in post-stroke patients, 3) To investigate potential associations between kinematic variability and clinical scores in post-stroke patients.

Materials & Methods: 12 chronic stroke patients and 10 control participants were included. Kinematic variability was expressed as Gait Standard Deviation (GaitSD) calculated for a minimum of six gait cycles. Clinical scores included the 10 Meters Walk Test (10MWT), 6 Minute Walk Test, new Functional Ambulation Classification (nFAC), Gait Deviation Index (GDI) and composite scores for strength, spasticity, range of motion and sensitivity.

Results: GaitSD for post-stroke patients (1.84°, Q1–Q3 1.43–2.04) was higher compared to control participants (1.36°, Q1–Q3, 1.17–1.52) (p<0.01). A cut-off threshold for a GaitSD of 1.3° has been identified to distinguish a patient subgroup with high variability. In the patient group, the GaitSD between the paretic side (1.90°, Q1–Q3 1.53–2.20) and the non-paretic side (1.63°, Q1–Q3 1.47–2.06) approached the borderline of significance (p=0.09). Correlation analyses indicated that GaitSD was associated with 10MWT (r=0.65, p=0.02). The greater the kinematic variability of the patient, the slower the patient walked.

Conclusion: The increased kinematic variability in both lower limbs suggests deficits of the paretic side and compensatory mechanisms of the non-paretic side in post-stroke patients.

These alterations may influence walking performance. Our findings are needed to confirm these **Results** and to evaluate the effect of therapeutic interventions on kinematic variability. Future work may focus on evaluating the clinical utility of GaitSD in relation to risk of falls after stroke.

P177

Enhancing cognitive neurorehabilitation of attention by using gamified exercises in immersive virtual reality: a preliminary study

C. A. Pestiaux (Lausanne/CH), D. Zeugin (Lausanne/CH), N. Farron (Lausanne/CH), H. Perrin (Lausanne/CH), D. Perez-Marcos (Lausanne/CH), A. Serino (Lausanne/CH), U. Guerra-Lopez (Lausanne/CH), S. Crottaz-Herbette (Lausanne/CH, Lausanne/CH)

Neuropsychological rehabilitation of attentional functions concerns about 80**%** of brain-injured patients. As attentional functions are involved in many activities of daily living, their rehabilitation is a priority and must be effective. Immersive virtual reality (VR) has been recently proposed as a medium offering 3D, 360° multisensory stimulation into dynamic and gamified tasks, which can continuously be adapted to the patients' needs. Such unique features can boost patients' motivation and rehabilitation dosage, which optimizes recovery.

The aim of the study is to determine the feasibility and the impact of enhancing the dose of neuropsychological rehabilitation by adding VR-based exercises to the standard of care, focusing on alertness deficits as the primary clinical outcome.

We used a VR-based program (MindFocus, MindMaze SA) targeting attention, and composed of gamified exercises incorporating evidence-based methods of cognitive rehabilitation. 15 patients with attention deficits and acquired brain injury, hospitalized in a neurorehabilitation unit, received standard rehabilitation enhanced by up to 20 additional sessions (3–5 sessions/week) of VR-based exercises. Alertness was assessed before and after training using the standardized subtest of the Test of Attentional Processes (TAP).
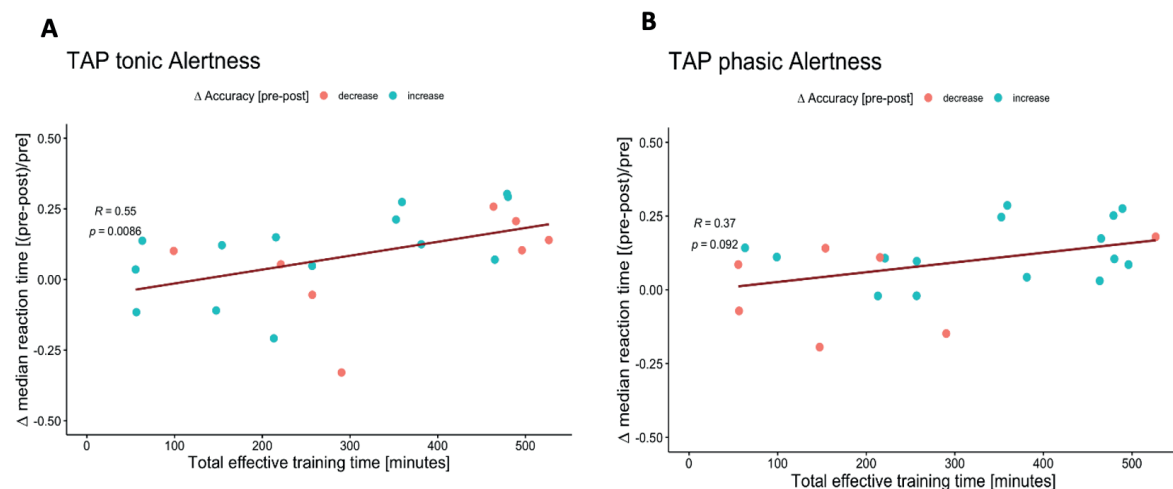
P177 Fig. 1. Percentage of improvement in median reaction time (ms) according to the total effective training time in the tonic (1a) and phasic (1b) tests of the TAP battery. The percentage of improvement corresponds to the differences between the median reaction times measured before and after the training divided by the reaction times before. This allows to take into account the initial level of the patients in the calculation of the improvement. Blue dots: increase accuracy after the training, Red dots: decrease accuracy after the training.

Analyses focused on the evolution of reaction times across these assessments in relation to the effective training time of the alertness-enhancing activities.

On the alertness test, patients were faster on the phasic test compared to the tonic test in both the pre and post sessions. A 2 x 2 ANOVA between assessments was performed to investigate the effects of time (Pre & Post) and type of alert (Tonic & Phasic) on reaction time. It confirmed a significant main effect of the time factor, but the alert type factor and the interaction between the two factors were not significant. Further analyses of the effect of training time showed that for tonic alertness, the longer the effective training time in immersive VR, the more the patients improved **(Fig. 1a)**. While the effect for phasic alertness did not reach statistical significance, the data showed a notable trend in the expected direction. **(Fig. 1b)**. Furthermore, for the phasic test, the patients who improved the most in reaction time and played the most (upper right part of the graph in **Fig 1b**) were also those who showed an i

mprovement in accuracy (blue dots in **Fig. 1b**). This dichotomy is not observed in the tonic test.

In combination with standard cognitive rehabilitation, specific attentional training activities in VR improved tonic alertness, and this effect depends on the time effectively spent during VR training. Future studies will need to disentangle the specific effects of such programs from those related to an intensification of rehabilitation, which may be independent of the content of the additional sessions. These preliminary results will help to develop more personalized programs.

P178

Sequential percutaneous needle Achilles tenotomy is safe and effective for Achilles tendon contracture management

J. Y. S. Lau (Singapore/SG), E. Chew (Singapore/SG)

Introduction: Achilles tendon contracture is a common spasticity related complication from neurological conditions such as stroke or acquired brain injury. Percutaneous Achilles tenotomy by triple hemisection has been used by Hoke since 1931. It is safe, has negligible scarring and low complications rates. However, few have reported on the efficacy and safety of repeated or sequential tenotomies.

Objectives: We aimed to evaluate if sequential percutaneous partial Achilles tenotomy, combined with other **Methods** of spasticity management; could help to improve Achilles tendon contracture which was resistant to Botulinum toxin injections alone, without increased complications.

Patient & Methods: We describe a case of a 78-year-old female patient who suffered a traumatic right frontal intracranial haemorrhage and left subdural haemorrhage requiring right decompressive craniectomy and evacuation in October 2019. She subsequently underwent an autologous cranioplasty in June 2020. From August 2020, she was noted to progressively require assistance with ambulation and basic activities of daily living with worsening cognitive decline. She was eventually non-ambulant and developed left ankle plantarflexion contracture. She was diagnosed with normal pressure hydrocephalus requiring ventriculoperitoneal shunt insertion in September 2022. Botulinum toxin injections were administered in August 2022 without improvement in the degree of contracture.

Results: She underwent her first percutaneous needle partial Achilles tenotomy under ultrasound guidance with serial casting in September 2022. Pre-tenotomy, her left ankle plantarflexion contracture was at 55 degrees from neutral, which improved 34 degrees from neutral immediately post-tenotomy. The left ankle plantarflexion contracture was subsequently measured at 40 degrees four days later, when she underwent her first serial casting. This subsequently improved to 30 degrees, which remained stable after one further round of serial casting at 3-day intervals. She was then switched to a bivalve cast. She was then reviewed in the outpatient clinic in November 2022, during which time the plantarflexion contracture was noted to have regressed to 35 degrees. Botulinum toxin injections and a repeat percutaneous needle tenotomy to the left Achilles tendon were performed, following which the contracture improved again.

Conclusion: We describe the technique for percutaneous partial needle tenotomy of the Achilles tendon as a treatment option for contracture management, and suggest that it may be safely repeated with continued efficacy at a short interval.

P179

Optimized trans-cranial direct current treatment for a patient with titanium mesh: a case report

G. Y. Park (Bucheon-si/KR), K. H. Park (Bucheon-si/KR), H. Y. Park (Bucheon-si/KR), S. Im (Bucheon-si/KR)

Introduction: Various attempts have been made for a prolonged state of minimal consciousness (MCS) using pharmacological agents or applying neuromodulation. Among these, transcranial direct current stimulation (tDCS) has shown the potential to restore awareness in patients with MCS. Most brains of patients in the MCS state have severe damage and are structurally and electrophysiologically different from the intact brain. Thus, neuromodulation with the conventional EEG 10-20 system has several neurophysiological limitations for patients with MCS. We present our experience with a patient with prolonged MCS and severe brain damage, who had undergone cranioplasty with titanium mesh, but was treated with tDCS with simulation and optimization based on using the patient's brain magnetic resonance image (MRI). The treatment proved to be successful resulting in the emergence from MCS and significant neurological improvement.

Case: A 62-year-old woman underwent a series of operations for subarachnoid hemorrhage with a ruptured postersior communicating artery, including coil embolization, decompressive craniectomy, ventriculoperitoneal shunt, and cranioplasty with a titanium mesh. Following the operations, the patient was diagnosed with MCS, and her revised coma recovery scale (CRS-r) score was 3. One year later attempts for non-invasive neuromodulation treatment to improve the patient's level of consciousness were discussed. However, due to the conductivity of the titanium mesh, conventional neuromodulation with tDCS was not considered as a treatment option. Under the consensus and agreement from all her legal guardians, she underwent treatment with tDCS to facilitate the dorsolateral prefrontal cortex (DLPFC). Based on the patient's MRI, we simulated the electric field and locations for targeting the right DLPFC via Neurophet's TesLab. Simulation with the conventional 10-20 system revealed the Enorm of the target was lower, and the area of

maximal Enorm shifted from the right DLPFC to the inter-hemispheric area. The electric field for stimulations with optimization on MRI showed the proper Enorm of the right DLPFC. After the patient was treated with ten consecutive optimized tDCS sessions, she woke up with a CRS-r score of 17. Two months later, she showed dramatic neurological recovery including nasogastric tube weaning, and was able to start full oral feeding. She also showed improvement in communication and truncal control.

Conclusion: With the growing popularity of non-invasive neuromodulation, optimization, and personalization have become essential for the effective use of noninvasive brain stimulation treatments. This personalized approach would make the treatment available even to patients with severe brain structural changes and metallic instrumentation.

P180

Rehabilitation outcomes in right-hemispheric and left-hemispheric TIA patients

D. Maslarov (Sofia/BG), D. Drenska (Sofia/BG), J. Maslarova-Gelov (Sofia/BG), I. Gelov (Sofia/BG)

Introduction: Functional hemispheric asymmetry is a unique phenomenon. Multiple studies have reported differences in clinical features and functional independence in people presenting with right and left hemisphere stroke. TIA is defined as a serious medical condition. Cardiac rehabilitation for individuals with TIA seems to be a promising intervention to change the risk factors and unhealthy lifestyles.

Objectives: A comparative 3-month follow-up study between two groups of TIA patients – right-hemispheric, n=24, and left-hemispheric, n=24, who participated in a 10-week modified cardiac rehabilitation programme. The outcomes were 1) levels of recovery in functional and cognitive impairments and 2) rate of recurrence of a new acute cerebrovascular event after TIA onset.

Materials and Methods: Subjects were enrolled from January 2021 to January 2023. The mean age was 65.9 ± 14.2 years, and 56**%** of them were male. Patients underwent an assessment including ABCD2 score and 6-Minute Walk Test. Cognitive functions were measured using a Montreal Cognitive Assessment (MoCA) within 72 hours of confirmed diagnosis and 3 months thereafter. TIAs of undetermined etiology and with symptomatic carotid artery stenosis (≥ 70**%**) were excluded. A rehabilitation plan consisted of physical exercises twice a week for 60 minutes and online training in education and healthy habits once a week for 45 minutes.

Results: Right-hemispheric TIA patients were associated with a low and medium risk (ABCD2≤5), more frequent complaints of fatigue and sleep disorders, and with a lack of significant improvement in cognitive impairment changes at 3-month follow-up. After the rehabilitation period, both groups showed better results in the 6-Minute Walk Test, and an equal incidence of subsequent cerebrovascular events.

Conclusion: Cardiac rehabilitation demonstrates considerable health benefits and is an important part of treatment and prevention. Hemispheric specialization of cortical interactions should not be underestimated in patients with TIA and stroke.

P181

Effects of combined Botulinum toxin A and controlled dynamic stretching orthotics on gait in children

L. van der Stam (Berlin/DE), M. Bülow (Berlin/DE), A. M. Kaindl (Berlin/DE)

Introduction: Children with spasticity, endure the secondary problems that come with it. Such as contractures, gait and eventually in functional motor difficulties and participation limitations. Even though Botulinum Toxin A (BTA) works great in reducing spasticity, it does not solve secondary problems. Therefore BTA is combined with orthotics or casting to improve passive range of motion (PROM), in order to work on gait and functional motor abilities. Our hypothesis is, by improving PROM in the ankle joint due to the combinational therapy of BTA with controlled dynamic stretching (CDS) orthotics, also gait and gross motor function will improve.

Patients & Method: Eleven patients, diagnosed with spastic cerebral palsy, were injected with BTA and monitored for the following 6 months post-injections. During this time period, all patients were fitted with a CDS orthotic for knee- and ankle extension. Video recording of mobile patients (n=8) were evaluated by Edingburgh visual gait score (EVGS) and nine patients were tested by gross motor function measurement (GMFM-66).

Results: Gait improved significantly over the course of treatment (p=0.011) The median EVGS score improved from a median of 17,5 at baseline to a median of 11,5 at 3 months (p=0.225) and further to a median of 10,00 (p=0.0053) at 6 months. All patients (n=11) show non-significant improvements of PROM from baseline median 0° to a median of 5° (range -10° – 25°) at 3 months (p=0.427) and back to a median of 0° (range -10° – 15°) at 6 months (p=0.762) evaluation. Correlation between PROM and gait improvements is not significant (p=0.069) but shows a moderate correlation (r=0.67). GMFM score shows a trend of improvement from a median of 65.3 at baseline to a median of 68.1 at 6 months (p=0.148) and show to have no correlation to PROM (r=0.153).

Discussion: This combinational treatment showed possibilities to treat not only to ICF level of body function, but also on level of activity. This small cohort shows a significant improvement of gait 6 months after treatment with a moderate correlation to PROM improvements. Further studies will need to analyze larger cohorts and over a longer time period.
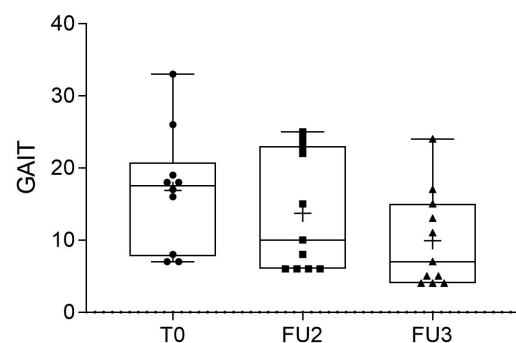
P181 Fig. 1
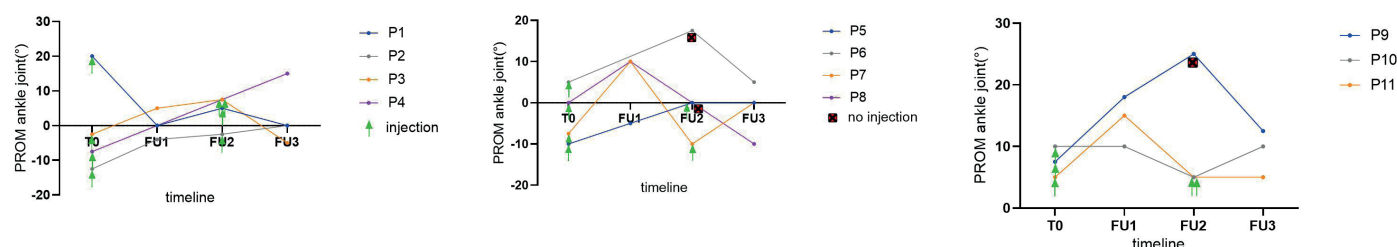
P181 Fig. 2

P182

Neuro-orthopedic and functional consequences of confinement due to COVID 19 in children with cerebral palsy and followed at the PRM service of the UH of Constantine, Algeria

S. Lemai (Constantine/DZ), R. S. Kelil (Constantine/DZ), I. S. Laib (Constantine/DZ)

Background: The world has experienced a health crisis due to the viral infection known as Coronavirus Disease 2019 (COVID-19). The latter has become a real pandemic because of its incredible speed of spread associated with significant mortality.In addition to the lockdown, health structures have been forced to reorganize themselves by increasing the number of beds, at the expense of certain services such as the Physical Medicine and Rehabilitation Department of the UH of Constantine.

This confinement has spared no one, among these people, a particular population: CEREBRAL PLASY children who require regular monitoring and continuous care at home and in hospital. Through this cross-sectional descriptive study, we wanted to analyze the consequences of confinement on PC walking children lost to follow-up since the beginning of confinement.

Materials and Methods: This is a cross-sectional descriptive study involving 23 patients with walking cerebral palsy, followed in the MPR department of the CHU de Constantine, and lost to follow-up since the beginning of confinement.

In order to identify the consequences due to confinement on this population, and the real reasons for this loss of sight. We mainly noted: epidemiological data, neuro-orthopedic parameters and functional status before and after confinement, the type of intervention necessary for return, and the reasons for disintegration.

Discussion: The Covid-19 lockdown has had a negative impact on our CP walking patients with increased neuro-orthopedic disorders and a decline in functional status.

This is due to several factors: interruption of medical follow-up, with absence of prescription and injection of botulinum toxin, lack of renewal of physiotherapy, lack of renewal of equipment and technical aids. To cope with this decline, rehabilitation care is essential, as early as possible, adapted to the case by case and especially long continued.

Conclusion: Telemedicine is a very interesting alternative in this kind of situation, to avoid the deleterious interruption of the follow-up of these patients, it must be possible to develop and apply it whenever restrictions affect the movement of CP patients.

P183

Effectiveness of medical rehabilitation in children with spastic type of cerebral palsy, stratified by age and sex

M. Sopromadze (Tbilisi/GE), I. Natroshvili (Tbilisi/GE), E. Tataradze (Tbilisi/GE), T. Svanishvili (Tbilisi/GE), Z. Sopromadze (Tbilisi/GE)

Introduction: Multidisciplinary approach to rehabilitation of children with spastic diplegia is relatively new for Georgian settings. Ken Walker Rehabilitation Clinic has a capacity to provide complex assessment and rehabilitation of children, with an emphasis on multidisciplinary approach.

Objectives: The goal of our study was to assess effectiveness of multidisciplinary rehabilitation interventions in children with spastic form of cerebral palsy, according to age and sex groups.

Patients and methods: 30 patients (15 girls and 15 boys) were observed in Ken Walker Rehabilitation Clinic during the years 2022-2023. Two main criteria were applied for inclusion of the patients: 1) The patients had the diagnosis of spastic diplegic palsy; 2) Patients' age was 5 to 12 years old. Patients were divided in two age groups: 1st group – 5-8 years of age (16 patients) and 2nd group - 9-12 years of age (14 patients). The patients underwent 110 sessions of physical therapy during one year. All patients were assessed by Gross Motor Function Measure (GMFM) before the inclusion in the study, at 6 and 12 months.

Results: In the first group (5-8 y.o.), the following **Results** were observed after 6 months of continuous physical therapy: improvement of range of motion, balance, coordination, flexibility, muscle strength, endurance. GMFM score improved by 71**%** in boys and by 67**%** in girls (the difference was not statistically significant). At 12 months, GMFM improved by 76**%** in boys and by 77**%** in girls.

In the second group (9-12 y.o.), the following results were observed after 6 months of continuous physical therapy: improvement of range of motion, balance, coordination, flexibility, muscle strength, endurance. GMFM improved by 50**%** in boys and by 45**%** in girls. At 12 months, GMFM improved by 59**%** in boys and 52**%** in girls (the difference was not statistically significant at either of the time points).

Conclusion: Effects of comprehensive rehabilitation of children with spastic cerebral palsy are more prominent among children younger than 8 years, compared to older age group. In both age groups, effects are similar for both sexes and no statistically significant difference is observed between the girls and the boys. Multidisciplinary rehabilitation should continue with the same intensity among children of both sexes, with an emphasis on early intervention.

P184

Occupational therapy management of upper limb dystonia in cerebral palsy

H. Zerouga (Oran/DZ), H. Achouri (Oran/DZ), F. Bouchiba (Oran/DZ), F. Benali (Oran/DZ), I. Bentidjini (Oran/DZ), C. Dilmi (Oran/DZ), _K. Layadi_ (Oran/DZ)

Introduction:

- Cerebral palsy is the primary cause of acquired secondary dystonia in child.
- Distal dystonia of the upper limb interferes with manual skill
- Botulinum toxin injections are often used in case of focal dystonia or focal targets
- Occupational therapy and toxin injections are recommended

Patients and Methods:

- Cross-sectional study January 2022 – March 2023
- Recruitment of all CP children with upper limb distal dystonia
- Initial assessment
- Gripping assessment
- MACS, Box and block test, MIF môme

Results:

- 14 cerebral palsy, six girls and eight boys, three of them go to school and had writing difficulties
- MACS: majority III – IV
- Box and block test: mean twenty cubes per minute
- all had occupational thérapy, four had Botulinum toxin injections, the trigger muscles were injected

Discussion/Conclusion:

- occupational therapy improved manual skill
- choose the right muscles to inject
- toxin and occupational therapy give good results
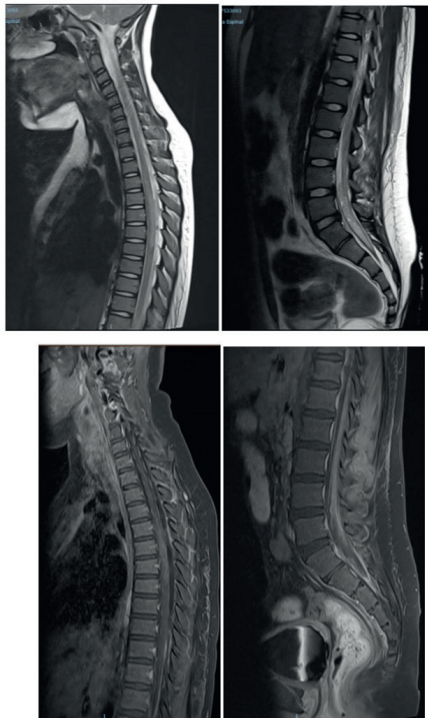
P186 Fig. 1

P186 Fig. 2

P185

Guillain-Barré Syndrome in infancy, psychomotricity management

H. Zerouga (Oran/DZ), K. Layadi (Oran/DZ)

Guillain-Barré syndrome is rare in infancy, the diagnosis is difficult in this age range. Management must starts early and be continuous in infants in full psychomotor development. The main parents' complaint is when their child regains walking.

We report the case of a 10-month-old girl who presented with acquired hypotonia affecting the 4 limbs with loss of sitting balance. She was seen in Physical Medecine and Rehabilitation department at one week of evolution. Guillain-Barré syndrome was diagnosed, the infant received immunoglobulins and immediately started psychomotricity sessions. Healing was complete and after 08 months of psychomotor work the infant was able to acquire independent walking. Psychomotor work is important, especially in infants, in order to avoid psychomotor developmental delay Guillain-Barré syndrome has a good prognosis in pediatrics if management is quick and correct, in order to avoid disabling sequelae for the child.

P186

Transverse myelitis to cauda equine syndrome in a patient with meningoencephalitis caused by pyogenes streptococcus

M. Corpas (Malaga/ES), A. B. Paba (Malaga/ES), F. Luna (Malaga/ES), A. Godoy (Malaga/ES)

Background and aims: Transverse myelitis is a focal neuro-inflammatory disease of the spinal cord in the absence of compression. It includes a variable spectrum of symptoms like progressive muscle weakness, paralysis, pain, sensory deficits and sphincter dysfunction. Etiology can be immunological or inflamatory, idiopathic or secondary to infections. We present the clinical case of a 11-year-old patient who was admitted to the pediatric intensive careunit in the context of meningoencephalitis due to Streptococcus Pyogenes. Our objective was to highlight physical therapy as one of the pillars of the treatment of spinal cord syndromes such as transverse myelitis and cauda equina to restore the previous functional status and readaptation to daily life

Methods: After septic shock and intensive care, the patient had improved and he recovered the level of consciousness, Rehabilitation unit was consulted to examine the patient, and we found paraparesis in the lower limbs, decreased motor reflexes and loss of sphincter control, hypoesthesia below T10 level and perineal anesthesia, as well as low back pain with right root radiation.

Results: Magnetic resonance imaging (MRI) was performed showing images suggestive of transverse myelitis from T3 to T8 associated with arachnoiditis of the lumbosacral roots in the cauda equina area. As a result of these findings, physical therapy with passive kinesiotherapy was intensified to maintain joint range of movement, active assisted for empowerment of upper limbs, bilateral antiequine passive postural orthoses, and multisensory stimulation associated with positioning measures and instruction to family members. The patient showed an improvement in motor function of the lower limbs according to the Medical Research Coun-

cil (MRC), he also recovered some sensory function at deep anal pressure as well as sacral levels.

Conclusions: Late diagnosis and treatment worsen the prognosis of these patients. Many of them do not achieve functional independence upon discharge. A thorough neurological examination assessing motor and sensory alterations are essential for early detection and treatment of the disease.

References:

1. Defresne P, Hollenberg H, Husson B, Tabarki B, Landrieu P, Huault G, Tardieu M, Sébire G. Acute transverse myelitis in children: clinical course and prognostic factors. J Child Neurol. 2003 Jun;18(6):401-6. doi: 10.1177/08830738030180060601. PMID: 12886975.Bal S, Kurtulmuş S, Koçyiğit H, Gürgan A. A case with cauda equina syndrome due to bacterial meningitis of anterior sacral meningocele. Spine (Phila Pa 1976). 2004 Jul 15;29(14):E298-9. doi: 10.1097/01.brs.0000131212.36990.0a. PMID: 15247591.Fig. 1, Fig. 2

P187

Correlation between mobility and arm function in patients with Duchenne Muscular Dystrophy

H. M. Ji (Seoul/KR)

Objective: The Duchenne Muscular Dystrophy Self Assessment Tool (DMDSAT) has been used in patients with Duchenne muscular dystrophy (DMD) to evaluate function of arm, mobility, transfer and ventilator support. Because this tool is both simple that can be easily completed by patients and/or their caregivers and informative, we translated DMDSAT in Korean and further analyzed its reliability. We also assessed the relationship between arm function and mobility function of DMD.

Methods: We translated the original DMDSAT into a Korean versionand tested 88 patients with DMD. Each one of the 88 patients was assessed 3 times in total. Initially by themselves, then by an interviewer on the same day. Finally a week later by the interviewer over the phone. We compared the results to understand inter- and intra-rater reliability.

Analysis of intra- and inter-rater reliabilities was performed using the intra-class correlation coefficient. Also, we analyzed the relationship between upper and lower extremities by using arm function and mobility score of the DMDSAT. Patients who underwent the DMDSAT from April 2020 to October 2021 were enrolled retrospectively. The arm function score ranges from 0 to 6, while the mobility score ranges from 0 to 5. (0 indicates the lowest functionality)

Result: The intra- and inter-rater reliabilities were significant for the total score, and an excellent reliability was noted in all domains of the DMDSAT (Table 1, Table 2).

The patients who underwent the DMDSAT from April 2020 to October 2021 were enrolled retrospectively (n=264), of which 160 patients were wheelchair bound. Nonparametric ANOVA analysis showed statistically significant correlation between the arm function scores and the mobility scores of these patients. The mobility scores, ranging from 0 to 5, were grouped into three: (1) Score 0 ("unable to control wheelchair without help" or "can use wheelchair except for a certain circumstances, such as cold weather"), (2) Score 1 (can use wheelchair indoors and outdoors), and (3) Score 2 to 5 (ambulatory phase).

We compared patients' arm function and mobility by Pearsoncorrelation, and found out that the arm function scores were highly maintained for patients with the mobility score from 2to 5. However, arm function scores of the patients who scored 1 on their mobility declined over time. The patients who scored 0 on their mobility showed even steeper decline in their arm function scores.

Conclusion: The K-DMDSAT is found to have high intra- and inter-raterreliabilities. Ambulatory DMD patients' upper extremityfunction is generally maintained. However, if their lowerextremity function further impairs and become wheelchair bound, we also start to see impairment of their upper extremity function. The degree of upper extremity function is correlated to wheelchair bound patients' lower extremity function.
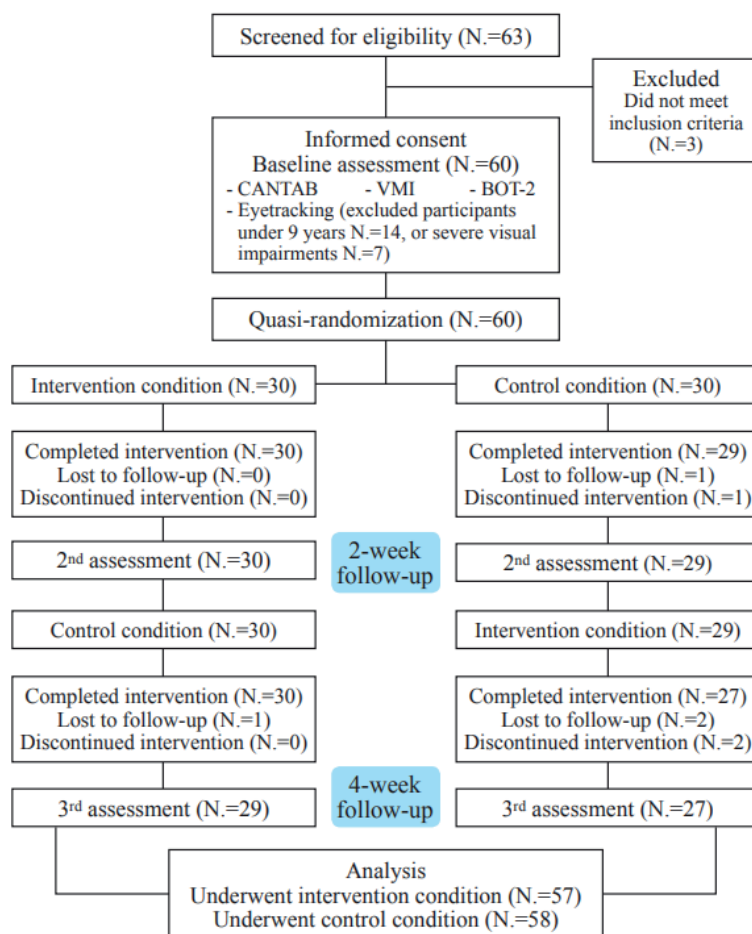
P188

The efficacy of short-term visual-motor training in pediatric postersior fossa tumor survivors: quasi randomized controlled experiment

V. Kasatkin (Moscow/RU), A. Deviaterikova (Moscow/RU), M. Shurupova (Moscow/RU), A. Karelin (Moscow/RU)

Background: Pediatric postersior fossa tumor (PFT) survivors experience a range of cognitive and motor impairments that require timely rehabilitation of these functions. A rehabilitation course in a short-term hospital stay (up to 1 month) is an extremely urgent medical goal for children surviving cancer.

Objectives: To evaluate the efficacy of short-term cognitive and motor training (CMT) aimed on visual-motor integration in PFT survivors using training devices.

P188 Fig. 1. Scheme of enrollment

Methods: Design of the study was "single center" quasi randomized controlled experiment. The study involved 63 children cancer survivors between the ages of 6 and 17 years that were outpatients of the Russkoe Pole Rehabilitation Center. The baseline level of cognitive and motor functions was assessed in all participants. Then the sample of patients split into two subgroups of equal sex, age, and diagnosis. The intervention subgroup received six sessions of CMT for two weeks, and the other subgroup underwent 'empty' two weeks with no intervention. Reassessment of motor and cognitive functions was conducted in all participants. Then the subgroups changed: the first subgroup underwent 'empty' two weeks, and the second subgroup completed the CMT, and further reassessment was provided.

Results: The primary results demonstrate an increase in gross and fine motor skills, motor coordination, visual-motor integration, and visual processing after CMT. Secondary results show that the age at onset is an important factor in the subsequent decline in cognitive, motor functions, and eye movements. Children with medulloblastoma perform worse on motor tests than children with astrocytoma. A tumor in the IV ventricle is the most harmful, and a tumor in the cerebellar hemispheres is the least harmful to a child's cognitive and motor development. This study shows the effectiveness of a short-term CMT program for children who survived PFT. The study also found that cognitive, motor, and visual-motor functions are affected by the tumor's localization, malignancy, and the child's age at onset.

P189

Enhancement of botulinum toxin type a effect by postsynaptic inhibitors of muscle contraction

M. Machicoane (Lausanne/CH), P. Onillon (Lausanne/CH), M. Stazi (Padova/IT), M. Tonellato (Padova/IT), M. Zainotto (Padova/IT), O. Rossetto (Padova/IT), M. Pirazzini (Padova/IT), J. M. Le Doussal (Lausanne/CH)

Introduction: Botulinum toxin (BoNT) is a first-line pharmacological treatment for cervical dystonia and spasticity in combination with physiotherapy. Typically, the onset of BoNT action takes up to one week and peaks between 4 to 8 weeks. The effect then starts fading 8 to 10 weeks post-injection in a significant proportion of patients with painful and disabling symptoms often reoccurring before BoNT re-injection. Hence, there is an urgent medical need for new treatments with BoNTs with earlier onset and possibly longer lasting effects.

Objectives: We tested whether the onset of BoNT/A pharmacological action at the neuromuscular junction (NMJ) can be accelerated by combining toxin injection with a fast-acting post-synaptic inhibitor of muscle contraction (hereafter POSI).

Materials & Methods: POSI was mixed with either onabotulinum, abobotulinum or incobotulinum, the three main commercial BoNT/A products, and injected in the tibialis anterior of rats. Onset, peak-effect and duration of myorelaxation were assessed with the digit abduction score (DAS), an assay assessing BoNT/A effects over time monitoring the abduction of paw toes, using the area under the DAS curve (DAS AUC) as readout for group comparison. Immunofluorescence for cleaved SNAP25 (cl-SNAP25) was performed to examine BoNT/A entry and persistence in motor axon terminals. Electrophysiology for the evoked and miniature end-plate potentials (e-EPP and m-EPP) was performed to

assess neurotransmission in nerve-muscle preparations of soleus muscles.

Results: The combination with POSI strongly accelerated the onset of myorelaxation compared to BoNT/A alone. Unexpectedly, the DAS assay also indicated a clear potentiation in BoNT/A peak activity, when the POSI alone has no longer effect, and a prolonged effect at later timepoints. To figure out the mechanism behind this potentiation, we monitored BoNT/A activity at the NMJ: the combination with POSI produced i) a signal of cl-SNAP25 already after 3h compared to the 6-9h of BoNT/A injected alone, supporting a faster entry of the toxin, and ii) a longer lasting blockade of neurotransmission, an evidence of extended duration. To understand the underlying mechanism, we evaluated the effects of POSI alone on neurotransmission at the NMJ monitoring the m-EPP, i.e., the spontaneous vesicle fusion events reflecting motoneuron excitability. We found that a few hours after injection POSI strongly increased the frequency of m-EPP, which normally are less frequent.

Conclusion: We hypothesize that the rapid muscle blockade caused by POSI triggers a potentiation of motoneuron excitability via a still unknown retrograde signal. Considering that BoNT/A enters via synaptic vesicle recycling, this in turns favors and accelerates BoNT/A uptake, and thus activity. Our findings uncovered the crosstalk between muscle and motoneuron at the NMJ as a novel layer to potentiate BoNT/A pharmacological performance.

P190

Medium-term functional goals of Selective Dorsal Rhizotomy (RDS) combined with intensive rehabilitation treatment in children with Cerebral Palsy (CP)

F. Frascarelli (Rome/IT), G. Esposito (Rome/IT), V. Ceccatelli (Rome/IT), R. Carbonetti (Rome/IT), G. Cordone (Rome/IT), V. Recchiuti (Rome/IT)

Background: CP is the leading cause of motor disability in pediatric age. The prevalence of CP has long been around 2 per thousand, with an estimated incidence of one new case per 500 live births amounting to 10 to 15 thousand new cases in Europe [9]. One of the problems with this issue concerns the clinical management of spasticity, and different approaches for treatment can be found in the literature []. In our work, we focused on the surgical technique of selective dorsal rhizotomy []. The aim of this study is to highlight the medium-term functional outcomes of RDS associated with intensive rehabilitation treatment in developmental-age subjects with CP.

Methods: The study was proposed to patients with CP (age between 4 and 12 years; level class at GMFCS between II and IV) in the care of Neurorehabilitation Department at Bambino Gesù Children's Hospital. Patient recruitment began in 2019 with specific inclusion criteria and is still ongoing. The assessment tools used are: Modified Ashworth Scale (MAS), Range of Motion (ROM), Gross Motor Function Measure-88, Gillette Functional Assessment Questionnaire (FAQ Walking Scale), WeeFIM (Pediatric Functional Independence Measure), Care and Comfort Hypertonicity Questionnarie (CCHQ). Tests were administered before/after surgery and at 6–12 months follow-up. After surgery and at subsequent follow-up times (6–12), all patients underwent intensive rehabilitation training lasting 1 month.

Results: In our prelimnary study were included the 11 patients (including 6 females and 5 males, mean age 8.62.38). The analyzed results show qualitative improvement in all scales used. The GMFM T-Test analysis for paired samples of shows that the mean difference in Total-Scores at 12 months, compared to the initial pre-surgical assessment, is significant with an overall increase of 11.42 units (95**%** CI 0.32–22.50, p-value 0.04). Analyzing the mean values of the individual dimensions over time there is a statistically significant difference in domain E (walking) between the values recorded before surgery and 12-month follow-up (95**%** CI 4.03–28.03, p-value 0.01). This significance can also be observed between the mean scores at six-month and 12-month postoperative follow-up (95**%** CI 0.28–23.20, p-value 0.04).

Discussion: This descriptive cross-sectional observational study showed that children who underwent selective dorsal rhizotomy combined with intensive rehabilitation treatment had an improvement, sometimes statistically significant, at six and 12 months after the intervention on all scales examined. This result is in line with other recent studies that support the superiority of combined treatment over physiotherapy alone or isolated surgery, highlighting the marked improvement shown in GMFM-88 scores []. The prospects are to increase the number of patients analysing and to verify, with control group, change lasts over time.

P191

A 10-year service evaluation of Major Neuro Trauma Rehabilitation Care at the Walton Centre, Liverpool, United Kingdom

G. Bavikatte (Liverpool/GB)

Objective: To analyse demographics and outcomes following brain and spinal trauma at the Major Trauma-(MTC) at the Walton Centre.

Population and sampling: The samples were polytrauma patients admitted from March-2012 to March-2022 predominantly brain and spinal cord with injury severity scores- ISS >15 and <15

Data collection: The data is gathered from the Trauma Audit and Research Network-TARN-database.

Data analysis: We have gathered data on the number of patients, age, gender, mechanism of injury, ISS, ICU stay, length of stay-LOS, the outcome at 30 days, rehabilitation prescriptions and Glasgow Outcome Scale-GOS

Results: The MTC received 2,599 polytrauma patients including 2,240 neurotrauma with 2,160 being ISS >15, and 80 patients with ISS of <15. A total of 264 spinal trauma were received, out of which 63 were ISS >15 and 201 with ISS<15. The age of patients ranged between 16 to 101 years with males comprising of 73**%** and females were 27**%**. The rehabilitation prescription was completed in 96**%** of cases.

Our study showed that non-violent mechanism of injury that included falls and road traffic collisions were responsible for 84**%** of brain trauma and 96**%** of spinal trauma. The ICU and hospital LOS for brain injury were longer than spinal injury patients.

The patient outcomes scores at 30 days demonstrated that 90.7**%** were alive in severe cases versus 98.7**%** in mild to moderate brain injury. While in spinal injuries, the outcome at 30 days revealed that 98**%** alive in both severe and mild to moderate trauma cases.

The recovery for patients with severe brain trauma i.e., GOS showed 40**%** of patients achieved good recovery and 25**%** had moderate disability. In severe spinal trauma, 17**%** had good recovery and 6**%** had moderate disability.

Conclusions: Successful delivery of high-quality early rehabilitation care provision accomplished that is evident from improved outcome scores. The on-time prescription passports generated a seamless pathway within teams during the patient's rehabilitation journey.

P192

Chronotype Affects Physical and Mental Health Status of Migraineurs

D. Baksa (Budapest/HU), N. Eszlari (Budapest/HU), D. Torok (Budapest/HU), G. Juhasz (Budapest/HU)

Background: Previous studies showed mixed **Results** regarding the association between migraine and chronotype.

Objectives: Our goal was to investigate the effect of chronotype on physical and mental health status of migraineurs and controls in a large cohort.

Patients & **Methods** A sample of the UK Biobank database (Application no. 71718) was used (n=360 112; 54.4**%** female, mean age: 56.53 years) in our cross-sectional study. Migraine status was based on the G43 ICD-10 code, while chronotype, neuroticism, current depression, stress, body fat percentage (BFP) and overall health rating were measured with self-reported questionnaires. We compared the following groups with ANOVA and Kruskal-Wallis test in SPSS 27: morning type controls (Cm, n=210 787), evening type controls (Ce, n=129 193), morning type migraineurs (Mm, n=12 194) and evening type migraineurs (Me, n=7 938).

Results Morning chronotype was more frequently reported by both migraineurs (60.6**%**) and controls (62**%**), however the ratio of evening chronotype among migraineurs was still higher than expected (2=16.474, p<0.001). The Me group showed the highest level of neuroticism (F=899.296, p<0.001), current depression (F=1261.6, p<0.001), stress (H=825.4, p<0.001), BFP (F=523.662, p<0.001) and the worst health status (H=2437.492, p<0.001), while the Cm group was in the most advantageous state in every category.

Conclusion Evening chronotype associated with the worst physical and mental health status among migraineurs – suggesting a need for emphasized medical attention in this patient group.
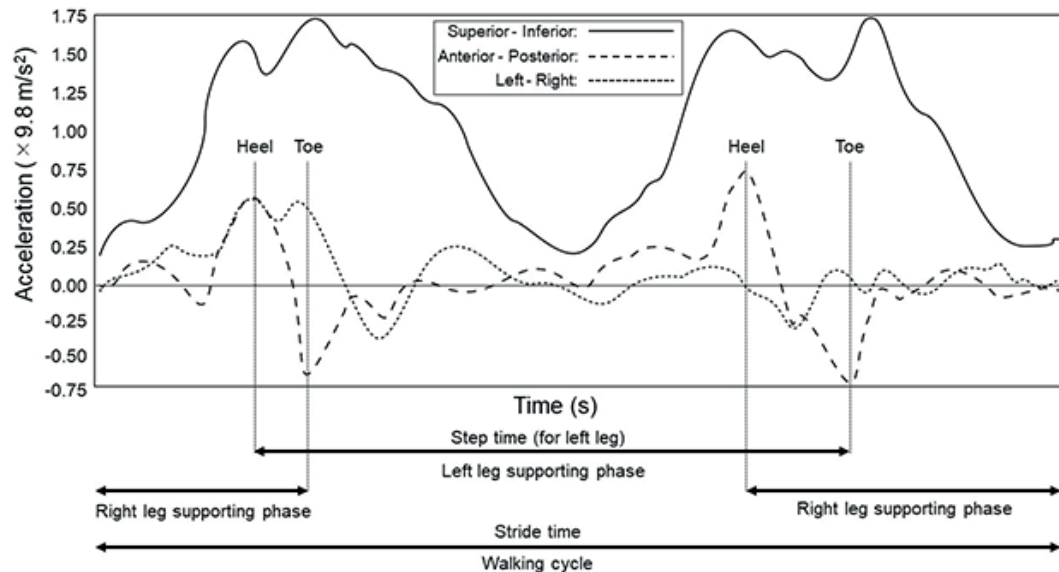
P193

**Potential gait performance variation during test-retest using a tri-axial accelerometer**

S. Fujiwara (Yahaba/JP), A. Sugawara (Yahaba/JP), K. Oikawa (Yahaba/JP), S. Sato (Yahaba/JP), T. Koji (Yahaba/JP), Y. Nishikawa (Yahaba/JP), Y. Nishimura (Yahaba/JP), K. Ogasawara (Yahaba/JP)

Introduction: Qualitative gait assessments have often been used for subjectively estimating the degree of neurological deficits/improvements in patients; thus, gait assessments can be easily performed by medical doctors without any

P193 Fig. 1

significant differences by *post-hoc* at the first assessment

AT NS ST CD GRF StT V SL
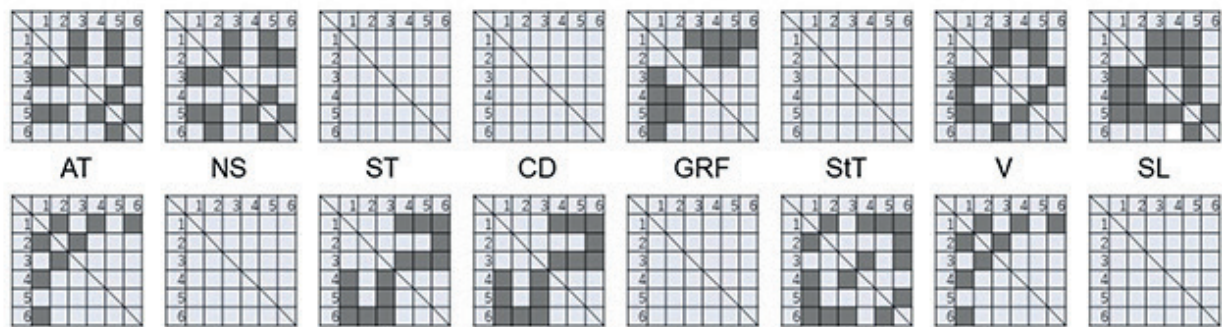
significant differences by *post-hoc* at the second assessment

■ : p<0.05

P193 Fig. 2

devices. Recently, a small portable device, which measures acceleration through movement of the trunk during walking, was used for assessment, and the gait parameters recorded from the dataset were confirmed to be associated with neurological deficits [1-4]. The assessment under the same condition is repeatedly performed, and the average value calculated using multiple gait parameter values obtained by repeated assessments is used as the representative value of a participant. Reduction of noise and variation due to the subtle psychological and environmental changes during gait assessment is attained through averaging of values. However, practical variation in such gait parameters are not visually and statistically confirmed.

Objectives: To investigate whether potential variation of gait parameters during repeated gait performances can be visually and statistically assessed in healthy participants.

Materials and Methods: Each participant underwent a 10 m walk test (10 MeWT) six times in each gait assessment, using a tri-axial accelerometer (MG-M1110-HW, LSI Medience, Tokyo, Japan) tightly fixed to the waist at the third lumbar vertebra of the backbone (L3) of the participant with a nylon belt [1]. The gait assessment for each participant was performed twice with an interval (from 1 to 3 months) under the same conditions (the device, an operator, and the walkway). Eight gait parameters (assessment time, number of steps, stride time, cadence, ground reaction force, step time, velocity, and step length) were automatically calculated from the wave dataset of each 10 m walk test wave (Figure 1). The differences among the six values from the repeated gait performances were examined through the gait parameters using the Friedman test with the post-hoc Conover test.

Result: In the first assessment, a significant variation in six values of five gait parameters was observed except for stride time, cadence, and step time. In the second assessment, however, the changes disappeared in terms of the number of steps, ground reaction force, and stride length, whereas it appeared in the three parameters that showed no change in the first assessment (Figure 2).

Conclusion: This study visually and statistically demonstrated that a significant variation exists in gait parameters during repeated gait performances in healthy participants.

Reference
1. Sato S, et al. Nucl Med Commun. 2020;41:1161-8.
2. Motl RW, et al. Acta Neurol Scand. 2013;127:384-90.
3. Utsumi H, et al. Acta Med Okayama. 2012;66:31-40.
4. Mitoma H, et al. Intern Med. 2010;49:2401-8.

P194

Novel SPG11 mutation presenting with Parkinson like features in a patient of hereditary spastic paraplegia: rehabilitation challenges

S. Ghosh (Patna/IN)

Background: Hereditary Spastic Paraplegia (HSP) is an umbrella diagnosis involving varied mutations, SPG11 being the commonest. Of these the SPG11 variant involving chromosome 15.1

Objectives: Reporting a novel phenotype with a novel mutation.

Patients: Patient aged 34 presented to the PM&R clinic with a 3-year history of rapidly progressing bilateral lower limb and trunk weakness, spasticity, ataxia, progressive slurring of speech and asymmetric pill rolling resting hand tremors at rest. His twin brother has the same complaints.

Genetic testing by Medgenome® labs revealed two heterozygous SPG11 gene mutations at exon 4[c.733_734 del (p.Met245ValfsTer2)] which is a known variant in patients having spastic paraplegia, and another at exon 34.[c.6347C>G (p.Thr2116Arg)], which is not available in ClinVar or 1000 Genome databases. The latter is a heterozygous missense variation in exon 34 of the SPG11 gene that **Results** in the amino acid substitution of Arginine for Threonine at codon 2116, in the spatacsin C-terminus domain of the SPG11 protein.

MRI showed severely thinned corpus callosum and periventricular hyperintense T2-weighted lesions.

Results: The spasticity in gastrocnemius, soleus, tibialis postersior and medial hamstrings was managed using Botulinum toxin injections followed by splinting with bilateral Ankle foot orthoses. Inpatient exercise regimen focusing on strengthening the core, gluteii, and antigravity muscles of the lower limb yielded moderate increase in power. The hand tremors responded well to dopamine, however the speech difficulties progressed unabated and did not respond to speech therapy.

Conclusion: Physiatrists need to be aware of novel mutations and myriad phenotypes of HSP to plan individualized rehabilitation.

Reference:

1. Kara E, Tucci A, Manzoni C, Lynch DS, Elpidorou M, Bettencourt C, Chelban V, Manole A, Hamed SA, Haridy NA, Federoff M. Genetic and phenotypic characterization of complex hereditary spastic paraplegia. Brain. 2016 Jul 1;139(7):1904-18.

P195

Potential therapeutic effect of Lamotrigine in disorders of consciousness after a traumatic brain injury: a series of 4 cases

C. Hérault (Lyon/FR), N. André-Obadia (Lyon/FR), L. Naccache (Paris/FR), J. Luauté (Lyon/FR)

Introduction: Therapeutic interventions to improve disorders of consciousness (DoC) following severe brain damages are still very limited. Among pharmacological treatments, Zolpidem and Amantadine have the best evidence to improve DoC today. Interestingly, their effect on DoC was discovered incidentally by clinical observations before large controlled studies. In our clinical practice, we observed several times an unexpected improvement of DoC after introducing Lamotrigine (LTG). A review of the literature found two stud-

ies reporting cases suggesting a beneficial effect of LTG in DoC. However the level of evidence is very low given the limited number of patients reported (n=14), the lack of a clear outcome, the lack of exhaustive data regarding the chronology of the clinical evolution and drugs onset/withdrawal and of course the absence of control group. Clinical reports with a comprehensive description of the clinical evolution together with all the pharmacological changes are important to consider before going forward towards control studies.

Method: We report four new cases of patients who were admitted in neurorehabilitation with a DoC and whose consciousness level improved after introducing LTG. We retrospectively collected all clinical descriptions during their hospitalization, in particular their score on the Coma Recovery Scale – Revised (CRS), as well as all the modifications of treatments affecting the nervous system, epileptic events and electro-encephalographic (EEG) information.

Results: The patients are one female and three males, aged between 17 to 32 years old, who suffered a severe traumatic brain injury. Three of them had a CRS between 7 and 9 with no evolution for at least 4 months before starting LTG. The fourth patient was admitted in neurorehabilitation after 4 months in Intensive Care Unit with a CRS fluctuating between 2 and 8 at best. LTG was started between day 147 and day 299 post-injury. Before the start of LTG, three patients were already taking an antiepileptic treatment. All patients had a standard EEG within a month before starting LTG, which showed no epileptic activity. LTG was titrated slowly until reaching 100mg/day. In all cases, the first signs of behavioral improvements were reported after a few days following the start of LTG. In three cases the CRS score reached a value of at least 20 within one to two months and a half after the start of LTG; in the fourth case, the CRS score reached a value of 12 but the evaluation of visual items was limited due to a cortical blindness.

Conclusion: Those case reports support the potential benefits of LTG in DoC. Beyond a direct restorative effect on DoC, clinical improvement may be related to the interruption of another anti-epileptic treatment (with potential negative effects on cognition), a better control of infra-clinical epilepsy or a thymoregulating effect. Further research is required to confirm this beneficial effect and precise the mechanism underlying it.

P196

Upper limb motor rehabilitation after TBI: a case study of novel computerized device for visual motor stimulation intervention

A. Plavsic (Ramat Gan/IL), T. Waintraub (Ramat Gan/IL), C. Ben Dan (Ramat Gan/IL), R. Levy (Ramat Gan/IL), T. Mizrahi (Ramat Gan/IL)

Introduction: Traumatic Brain Injury is a major worldwide public health and personal wellbeing issue. The long term outcome of TBI patients is mainly associated with the cognitive and motor consequences of the injury. Motor upper limb rehabilitation is one of the great challenges, which restrict patient's independency in BADL and IADL and community participation. Only a few rehabilitative interventions have an evidence of improving motor outcomes in these patients. Mirror therapy has been demonstrated to be an efficient method to facilitate motor learning and adaptive neuroplas-

ticity, mainly in stroke survivors, but its role in traumatic brain injuries is yet to be investigated.

Objective: We describe a case of a 20-year-old patient in the subacute phase post severe Traumatic Brain Injury (Motor Vehicle Accident) who suffers, among other impairments, from severe paresis of right upper limb.

Methods: As a part of the holistic multidisciplinary rehabilitation program, we built a motor upper limb rehabilitative intervention with a novel computerized device of Mirror Therapy-Intensive Visual Stimulation (IVS3, DESSINTEY, France). The intervention protocol was consisted of a four-week, five-time a week therapy. Every therapy session included exercising of four different movements, 6-8 minutes each.

In order to follow the patient's progress, we admitted a set of comprehensive assessments along the intervention period that included
1) Kinematics data from involving muscles – by surface EMG measurements,
2) Behavioral motor function assessments – Fugl-Meyer assessment,
3) Spasticity assessment – Modified Ashworth Scale-Revised and
4) Psychological mental assessment (CES-D).

In addition, we measured resting-state brain activity by 32-channel EEG at the baseline and after completing a full therapy protocol (4 weeks). We analyzed the data in order to assess the central effect of the intervention.

Results: The follow-up measurements have shown that the upper limb motor function and physical activeness have been improved during the computerized mirror therapy period. Moreover, the therapy seems to positively affect the mental-emotional state of the patient. We saw also a change in the brain activity pattern as reflected by EEG, which may indicate a potential positive neuroplasticity effect.

Conclusions: These primary results encourage further investigation of the new technology of computerized visual stimulation as a rehabilitative tool to facilitate recovery of upper limb motor function after TBI and optimizing functional outcome.

P197

Combination of active physiotherapy, neuroreactive stabilisation training and dynamic orthosis fitting to promote sports fitness in tetraparesis after traumatic brain injury

A. Dassel (Frankfurt a.M./DE)

In the present single case study, the sport-specific functions of the lower extremity of a 29-year-old female patient with right-sided tetraparesis were specifically treated over a period of twelve weeks by means of combination therapy consisting of active physiotherapy and neuroreactive leg and trunk training. The biomechanical conditions for sport-specific stability and mobility were created by therapeutic stimuli and the application of a dynamic spiral lower leg orthosis and a specific derotation bandage.

Background: Structural immobilisation damage and learned disuse lead to unfavourable changes in mobility, strength, perception and coordination. The aim is to rehabilitate the functional disorders as far as possible in order to promote the activity of playing tennis. The patient was active at a high level in junior tennis before her accident; partial

recovery is the goal of the intervention. Since the traumatic brain injury six years before the start of the intervention, no sport-specific training had been carried out, as the structural integrity would not have been sufficient here: spastic muscle activations of the right leg, pronounced weaknesses of the foot, lower leg, thigh, hip and lumbar musculature as well as disturbances of the proprioception of the right side led to a loss of control, a stable and rapid weight transfer, as is usual in tennis, could not be guaranteed.

Objectives: Gait quality was assessed using the Functional Gait Assessment (FGA) and Rivermead Visual Gait Assessment (RVGA). Postural system was tested using the Mini Balance Evaluation Systems Test (Mini-BEST).

Method: Testing was done before the intervention, after six weeks and at the end of the intervention period. The therapy consisted of specific muscle building training three times a week for 50 minutes, mainly for the muscles that stabilise the leg axis during weight bearing and propulsion, in each case the aids were applied. The foot muscles or their representative areas were activated before each training session with the help of electrotherapeutic stimulation. Mobility over stable parts of the body was achieved with neuroreactive stimuli, i.e. perturbations or facilitations through therapeutic grips or aids. Rolling activities based on the PNF strategy were aimed at increasing trunk control.

Results: The results of the FGA could be improved from 17 to 20 and finally 23 points. The RVGA could be reduced in terms of the total score from 42 to 36 and finally to 32 points. The Mini-Best score was 12 before the intervention, 14 at the intermediate test and 17 at the end. There were clear improvements in the stabilisation ability of the right lower extremity, so that the patient was able to resume regular tennis training after the intervention period.

P198

Principles of rehabilitation of patients after combat traumatic brain injury on the territory of Ukraine

I. Chernenko (Kharkiv/UA)

Combat traumatic brain injury (TBI) is the most common cause of death and disability in the adult population. As a result of combat TBI, there is mechanical damage to the skull or its intracranial formations, such as vessels, nerves, meninges and brain.

The constant increase in cases requires the study of medical and social aspects of this problem. Despite the great achievements of military medicine in the treatment of acute combat traumatic brain injury (TBI) in recent years, due to the full-scale war in Ukraine, the incidence of combat TBI among military personnel and the civilian population and the number of consequences of combat TBI are increasing, which often causes partial or complete disability. Combat TBI is a serious disease that requires detailed analysis and effective treatment and rehabilitation measures.

The organization of multidisciplinary teams is important. It is necessary to carry out complex treatment with occupational therapists, physiotherapists, neurosurgeons, neurologists, psychiatrists, traumatologists, emergency physicians, rehabilitation specialists, etc. Combat TBI rehabilitation includes kinesiotherapy (exercises to improve physical strength, regain flexibility and coordination of movements), occupational therapy (exercises that teach a person to perform daily activities), massage therapy, speech therapy

(development of speech communication), memory exercises, psychotherapy, such as art therapy, cognitive behavioral therapy.

P200

PNS (peripheral nervous system) interventions for expanding the sensate area in CNS lesions

S. Adiga (Auckland/NZ)

In case of complete peripheral nerve (PN) injuries, often we note shrinking of insensate area due to expansion of the neighbouring intact nerves. The evidence in that the peripheral nerves can grow beyond their usual territories into the new areas of adjacent denervated skin; also, they are capable of taking over such new territories across the axial lines of the limbs, midline of the body and across the clean surgical scars into a fascio-cutaneous flap.

However, such a phenomenon is not seen in case of CNS (Central Nervous System) injuries & diseases. Also, even in PN lesions, we do not see the neighbouring nerves taking over the paralysed muscles.

The focus of the present work is to explore the causes for such differences and look for treatment strategies that may help with similar recovery in many CNS (central nervous system) conditions.

The methodology used include literature review and peer discussions.

The results reveal definite gaps in literature & clinical application of the PN pathology principles to the CNS lesions.

It is expected that this work will lead to many further clinical management and research possibilities using the principles explored and discussed.

There are many areas where PN pathology principles can be applied to CNS lesions. These include strokes with sensory deficits, mid-thoracic level complete spinal injuries and cauda equina lesions. Also, the learnings from the sensory territory expansion / take-over following PN injuries can be used to formulate appropriate research questions and strategies with a view to encourage similar expansion / take-over happen with motor recovery following PN lesions.

It will help the clinicians & researchers in the audience can identify the right cases for appropriate interventions and discuss it with the right experts at right time.

Also, this opens up a case for detailed examination & documentation as well as use of neurophysiological investigation for many selective cases with potential for these novel interventions.

P201

Nerve combing for trigeminal neuralgia: a comprehensive review of the current techniques, outcomes, and future directions

M. E. Machado Musri (Asunción/PY), U. M. Tagle Vega (Cusco/PE), F. S. Juarez Tovar (Mexico City/MX), F. D. J. García Mendoza (Puebla/MX), K. U. Preciado López (Sinaloa/MX), J. Choque Velasquez (Cusco/PE)

Introduction: Trigeminal neuralgia (TN) is a chronic pain disorder characterized by severe facial pain [1] and can be classified into classical due to neurovascular compression (NVC), secondary, and idiopathic [2]. Internal Neurolysis, also known as Nerve Combing (NC), is a surgical procedure in which trigeminal nerve fibers are separated lengthwise between the pons and the porus trigeminus to relieve the pain [3].

Objectives: We aim to review the actual data on NC in TN, its history, primary surgical technique, and its comparison between other surgical treatments.

Materials and Methods: We searched PubMed, Scopus, and Web of Science databases with the keywords "Nerve Combing", "Internal Neurolysis", and "Trigeminal Neuralgia".

Results: NC is an effective treatment for patients with idiopathic TN (without NVC) [3]. Also, appears to be more effective than stereotactic radiosurgery, as effective as partial sensory rhizotomy, and likely more durable than radiofrequency gangliolysis. There is no significant difference between NC and percutaneous radiofrequency thermocoagulation in patients with idiopathic TN, although other studies state there is a possible beneficial effect of NC in comparison with glycerin rhizotomy [4]. MVD plus NC is more effective than isolated MVD for the treatment of TN with NVC, however, this is controversial due to other studies with contrasting results [5]. In patients with recurrent idiopathic TN with a prior MVD, NC can be a useful alternative6. Studies demonstrated that there is a high rate of Trigemino Cardiac Reflex during NC and that increased arterial blood pressure during NC had a significant correlation with a good surgical outcome, although more research is needed [2].

References
1. Jie H, Xuanchen Z, Deheng L, Kun G, Fengyang X, Xiang C, et al. The long-term outcome of nerve combing for trigeminal neuralgia. Acta Neurochir (Wien). septiembre de 2013;155(9):1703-8.
2. Liu J, Wu G, Jiang Y, Li L, Wang D, Liu R. Relationship Between Arterial Blood Pressure During Trigeminal Nerve Combing and Surgical Outcome in Patients with Trigeminal Neuralgia. World Neurosurg. mayo de 2020;137:e98-105.
3. Durnford AJ, Gaastra B, Akarca D, Lodge A, Ewbank FG, Noorani I, et al. Internal neurolysis: "nerve combing" for trigeminal neuralgia without neurovascular conflict – early UK outcomes. Br J Neurosurg. 4 de marzo de 2022;36(2):175-8.
4. Xu R, Materi J, Raj D, Alomari S, Xia Y, Nair SK, et al. Internal neurolysis versus intraoperative glycerin rhizotomy for trigeminal neuralgia. J Neurosurg. 1 de enero de 2023;138(1):270-5.
5. Zheng W, Dong X, Wang D, Hu Q, Du Q. Long Time Efficacy and Safety of Microvascular Decompression Combined with Internal Neurolysis for Recurrent Trigeminal Neuralgia. J Korean Neurosurg Soc. 1 de noviembre de 2021;64(6):966-74.
6. Feng BH, Wang XH, Li ST. Postersior Fossa Re-Exploration for Recurrent Trigeminal Neuralgia: Operative Findings and Surgical Techniques. J Craniofac Surg. julio de 2018;29(5):1284-6.

PRESENTING AUTHORS